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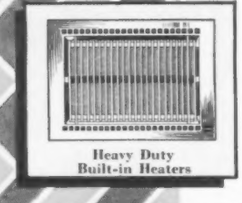
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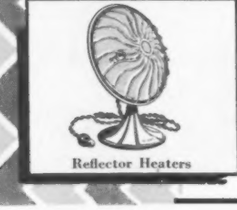
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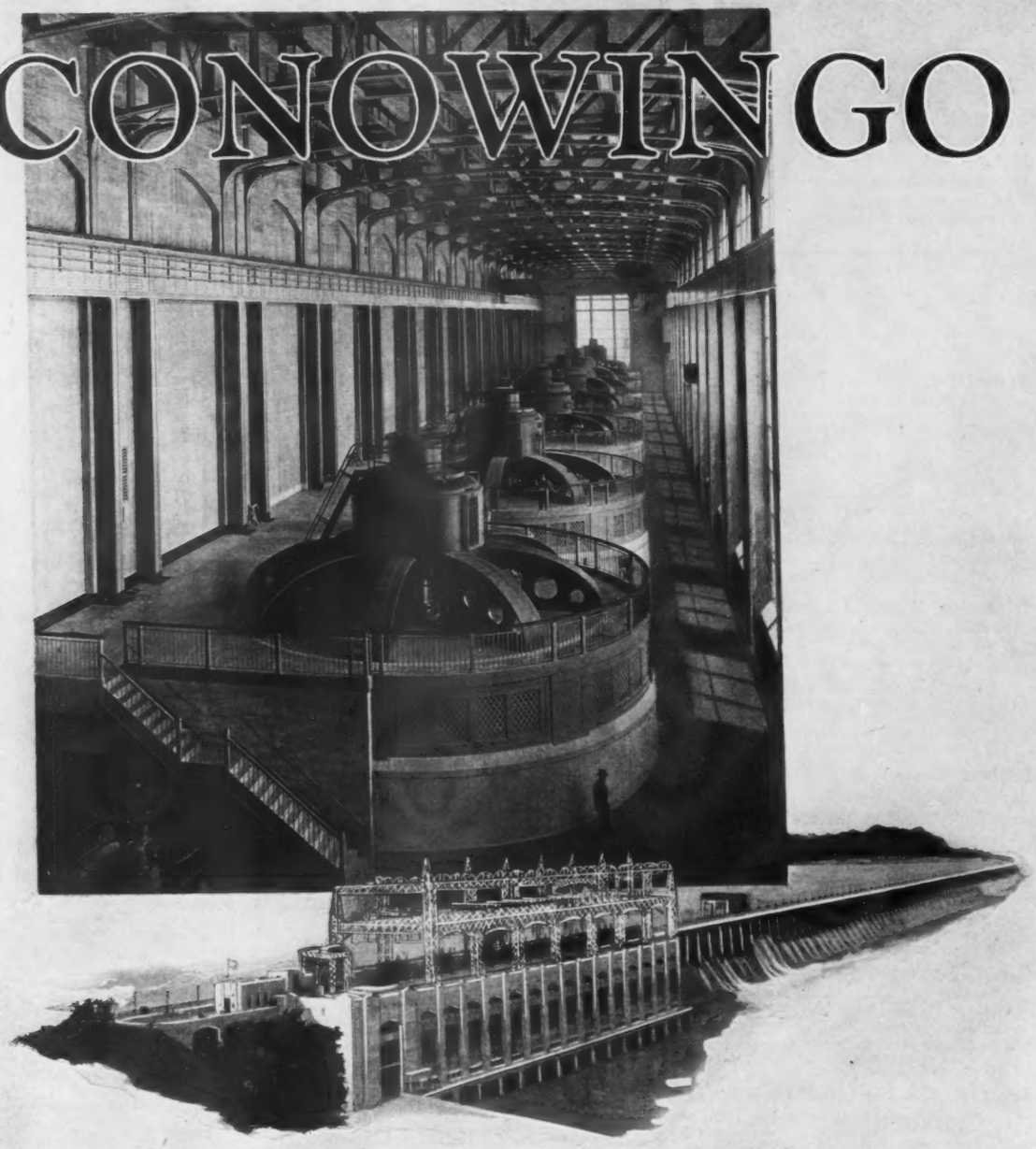

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President Hoover Re-affirms Government's Attitude Toward Business

"THE ELECTION has again confirmed the determination of the American people that regulation of private enterprise and not government ownership or operation is the course rightly to be pursued in our relation to business." In this statement in his inaugural address President Hoover sounded the keynote of the attitude of the federal government toward business during his administration. By so speaking the President dispelled any restraint that business might have adopted prior to the election, either through fear of a change in administration or through apprehension regarding the policies that he himself would adopt.

Amplifying the policy that he adopted in the Department of Commerce in his relations with business, the President said:

"In recent years we have established a differentiation in the whole method of business regulation between the industries which produce and distribute commodities on the one hand and the public utilities on the other. In the former our laws insist upon effective competition; in the latter, because we substantially confer a monopoly by limiting competition, we must regulate their services and rates. The rigid enforcement of the laws applicable to both groups is the very base of equal opportunity and freedom from domination of all our people, and it is just as essential for the stability and prosperity of business itself as for the protection of the public at large. Such regulation should be extended by the federal government within the limitations of the constitution and only when the individual states are without power to protect their citizens through their own authority. On the other hand, we should be fearless when the authority rests with the federal government.

"The larger purpose of our economic thought should be to establish more firmly stability and security of business and employment and thereby remove poverty still further from our borders. Our people have in recent years developed a new-found capacity for cooperation among themselves to effect high purposes in public welfare. It is an advance toward the highest conception of self-government. Self-government does not and should not imply the use of political agencies alone. Progress is born of co-operation in the community—not from governmental restraints. The government should assist and encourage these movements of collective self-help by itself co-operating with them. Business has, by co-operation, made great progress in the advancement of service, in stability, in regularity of employment and in the correction of its own abuses. Such progress however, can continue only so long as business manifests a respect for law."

Thus President Hoover reiterates statements made previously indicating that he views the public utilities, as well as business as a whole, with a sympathetic attitude and a deep understanding. Business man, engineer, Westerner, his is a difficult task of shaping public opinion toward a better understanding of the problems of business, which in the last analysis is the backbone of the nation. It is conceivable that time will reveal his to be an outstanding business administration. Business, rightfully, may hope as much.

William G. Kerckhoff— An Appreciation

TO THE names of Huntington, Martin, Eastwood, Britton—those pioneers who conceived and developed the light and power industry of California—there has been added another with the passing of William G. Kerckhoff. Closely allied with the commercial and industrial history of southern California and the great San Joaquin Valley for more than half a century, he leaves behind him as monuments to his name more than half a dozen great public utility, banking and commercial enterprises of tremendous significance to the development of the state.

His vision of the great possibilities of hydro-electric power came from his connection with the Azusa Ice and Cold Storage Company whose plant was run by water power. In 1897 with Allen C. Balch he built a hydro-electric plant on the San Gabriel River and transmitted power to Los Angeles. With Henry E. Huntington he organized the Pacific Light and Power Corporation, constructing plants on the San Antonio River and later on the Kern River with a 120-mile, 33,000-volt line to Los Angeles, a colossal achievement in those early days. The great Big Creek-San Joaquin project was the next product of his vision and enterprise for he successfully raised the money for this project in Wall Street before a shovelful of earth was turned. The names of Kerckhoff and Balch became connected with the San Joaquin Light & Power Corporation in December, 1902, when they bought that property at a receiver's sale. Mr. Kerckhoff served as president of the company until its acquisition by Western Power Corporation in 1924.

Gas utilities also were developed under his guidance, for he organized the Southern California Gas Company and later brought natural gas into Los Angeles from the McKittrick fields in the San Joaquin Valley through a 120-mile pipe-line. Lumber, land reclamation, shipping and banking were other fields in which he exercised his genius for organization and development.

Despite the imposing position he occupied in the utility and commercial world, he scorned any hint of monopolistic attitude. Public welfare and betterment guided all his actions, and he worked unselfishly and untiringly for the good of the commonwealth in which he made his home.

His persistent and undaunted courage in seeking and securing capital for his utility ventures, and his genius for organization have left a lasting mark upon

the development of California. Power plants, great dams, reservoirs and pipe lines will serve to keep his name engraved forever upon the pages of California's history.

Water Power Producing 40 Per Cent of Nation's Power U. S. G. S. Reports

WATER power in the public utility field is holding its own in spite of the remarkably increased efficiency of fuel-burning plants, it is declared by A. H. Horton, chief of the Division of Power Resources, U. S. Geological Survey, as a result of detailed studies covering the past decade. Although predicting that the construction of hydro-electric plants may reach a saturation point as steam becomes more advantageous, Mr. Horton states that, contrary to current belief, this has not yet happened. Without reference to the economic, political, or financial factors involved, all of which are subject to differing opinions, it is pointed out that the bare figures carrying the story up to date are indisputable. So far, definite trends are evident. Analyzing the hydro-power statistics, Mr. Horton says in part:

"Water power was used to generate 34,747,000,000 kw.-hr. or about 40 per cent of the total output of 87,851,000,000 kw.-hr. generated by public utility power plants in 1928. Water power has generated more than one-third of the electricity produced by public utility plants every year from 1919 to 1928. During the past four years the output by water power has increased more rapidly than the output by fuel power, and in 1928 would have been more than the 40 per cent attained had it not been for abnormally dry weather in the latter part of the year, which reduced the water supply." It was also shown that while the developed hydro power increased at the rate of 5 per cent a year in 1926 and 1927, the gain was 10 per cent in 1928.

Public utility statistics include about 80 per cent of the nation's electric output and 90 per cent of the hydro powers, thus serving as an accurate index in showing the trend of water power development, it is pointed out. Since manufacturers are buying more and more utility power, the Geological Survey figures follow the lines of greatest development. Manufacturing power plants make a more impressive showing on the basis of capacity but their low power factor cuts down their output. The prime movers installed by manufacturers reached a peak in 1917 but have fallen off since that time, while the utilities have shown increases in output compounding at the rate of about 10 per cent each year since 1919 excepting only 1921 when the industrial slump occurred.

With these factors automatically included in the compilation, it is to be argued that growing importance in the utility field makes a good case for hydro power. According to predictions, the ratio of hydro-electric power to the total production was to have fallen off before now. Nevertheless, this has not been the case and many think that, short-time factors aside, water power will continue to keep pace with steam for some time to come.

Turning to the subject of increased fuel efficiency, Mr. Horton states the following:

"Public utility companies and their power-plant operators were again successful last year in increasing the efficiency in the utilization of fuels in the generation of electricity. The amount of electricity generated by the use of fuels in 1928 was 5.5 per cent, or 2,738,000,000 kw.-hr. more than in 1927. The amount of fuel consumed, however, was only 1.1 per cent or 524,000 tons more than in 1927. The increase in output was therefore five times as much as the increase in the amount of fuel consumed." This might be stated another way by saying that the nation paid for its additional power at the rate of one-third of a pound of coal per kw.-hr.

Showing the dollar saving, Mr. Horton continues:

"The average rate of fuel consumption for the entire United States in 1927 was 1.84 lb. of coal per kw.-hr.; in 1928 the rate was reduced to 1.76 lb., a reduction of 0.08 lb., or about 1¼ ounces per kw.-hr. This small saving per kw.-hr. in generating the 53,000,000,000 kw.-hr. of fuel-generated electricity amounted to 2,120,000 tons in the year which is equivalent to about $8,000,000. In 1919 the average rate of coal consumption in generating electricity was 3.2 lb. per kw.-hr. The rate of 1.76 lb. in 1928 is therefore close to half the 1919 rate. If coal had been consumed by electric public utilities at the rate of 3.2 lb. per kw.-hr. in 1928, the increase in fuel consumption would have been about 38,000,000 tons, representing about $150,000,000."

It is to be added that if the 3.2 rate had obtained from 1919 through to the present day, the additional cost of fuel would have been in the magnitude of $700,000,000. In other words, increased efficiency has cut this sum from the public expense.

Of the 60 per cent proportion of the total output generated by fuel last year, coal furnished 88 per cent, gas 7 per cent, oil 4 per cent, and wood less than 1 per cent.

Back of the Red Seal Home Is an Industry Market

IMAGINATION is a valuable attribute—even to the business man. Members of the electrical industry, too many of them in fact, seem to take for granted that the Red Seal Plan of adequate house wiring is of interest only to central stations as regards its potentialities to load building, to manufacturers, jobbers and dealers in domestic appliances and supplies and, of course, to the electrical contractor who makes the wiring installation.

Of course, this really represents only a part of the constructive value of this movement to the industry as a whole. It may be stated as a truism that nothing affecting the welfare of any one branch of the industry directly can fail to have an influence on every other branch. Here, however, is a manufacturer whose horizon is broad enough to discern the benefits of this campaign and its far-reaching influence; here is a manufacturer of electrical motors and transformers which on the surface would appear to be remote indeed from adequate house wiring, and yet he writes, "As a matter of fact, we are very much interested in Red Seal activities as we are interested in any activity that moves the industry forward. Happily, we can see a little bit further into this matter than the tangible results of a particular job. If the Red Seal Plan is carried out, it means more outlets; more outlets mean more appliances; more appliances, more power consumed; more power consumed means central station equipment, including distribution equipment. The latter includes transformers."

Would that the industry possessed more men who could see as clearly as this manufacturer that the welfare of the industry as a whole is paramount. All branches are interdependent and share alike in good or bad whether they have the wit to see it or not.

The Convention Becomes a Big Show

EVEN conventions are changing. Particularly is this true of sales conventions. And are not sales conventions themselves a comparatively new institution?

More and more the arts of the theater are being applied to sales. More and more is industry recognizing that its biggest tasks are sales jobs. Therefore more and more is the sales slant, the dramatic slant, being injected into conventions. It is good for conventions that this is so.

For a while, to anyone who attended many conventions, the day of their usefulness seemed to be limited. Nothing new, nothing interesting or different was ever brought out in them. The same old papers were read. The same old banquets were held. The same delegates slept througout the same sessions or skipped others to play golf.

But the new convention is something that nobody skips. Nobody wants to miss anything. Because something new, something interesting, something of value is presented every precious minute, every delegate is awake and alive to receive it.

Nowhere was this so true as in the recent Frigidaire sales convention at San Francisco. It cost that company $25,000 an hour, and no doubt was worth every second. Certainly not a moment of it was wasted. It swung into action with rousing cheer and lusty song. It kept up a fast pace of dramatic sketches, well staged with well timed exhibits. Its speakers were trained, at ease, skillful and brief. Each supported his words with deeds, displays or dramatic effect. It was a most concentrated dose of salesmanship. But with what enthusiasm, what accord was it taken!

Certainly such methods will bring new life into convention procedure. Any annual convention will take on genuine value. Attendance at it will be prized and sought after. Results from it should appreciate. There is no reason why it should not become the outstanding event of the year in any industry.

Where Laws Are a Necessity

LAWS prohibiting this and that seem to be an ineffective weapon in most cases. Unless sentiment behind them is so strong as to give them something of the force of feeling which already prevails on the subjects with which they treat, they fail. Yet when loopholes in present statutes provide means whereby unscrupulous practices may be indulged in to the detriment of a large industry, such laws should be amended or redrafted in such a way as to minimize such opportunity for dishonesty.

The building laws, especially those portions of the statutes designed to protect the contractor and subcontractor, however, seem to be particularly weak in structure if such practices as have been brought to light can be carried on. That practically every large community in California, for example, has had its speciously financed building boom at the expense of material suppliers and sub-contractors, is evidence enough that building laws need redesigning rather badly.

The fraudulent methods employed have been described before in these columns. In this issue is described the legislation which is proposed to take the place of present inadequate statutes or to bolster up others at their critical points of strain.

It is unfortunate perhaps that some means other than legal cannot be found to make building safe for builders. There are now too many fees, inspections and regulations to the construction of even ordinary buildings—all because of dishonesties in craftsmanship in the past.

Perhaps not until the building industries clean house from within will these periodic blights cease to appear. It is too easy to get into such businesses. There are too few real tests of fitness required of participants in the building industry. Law will not correct this organic internal disability.

But until the millennium arrives a few laws do seem to be necessary. The proposed enactments seem particularly to deserve the support of the entire industry in behalf of a cleaner building bill of health.

Legislating Luxury Versus Selling It

NO MATTER how excellent in quality and service Rolls Royce automobiles may be, nor how desirable to the manufacturers might be a regulation making it compulsory for every automobile purchaser to buy nothing less than one of these fine cars, nevertheless no such law could be enacted. The law, in other words, cannot be made to take on a responsibility which belongs strictly to salesmanship.

With the best intentions in the world, there are many people who would attempt just such regulations with respect to electrical installations and merchandise. No matter how desirable, nor yet how economical eventually a certain standard of quality might prove to be, it is not the province of law to legislate quality.

Legislation must stop at what it can justify on a basis of reasonable protection to life and property—which admittedly as a minimum leaves much to be desired. Even if in some cases such protection would justify still stricter codes and ordinances than those already existing, neither codes nor local rules should be saddled with sales responsibility.

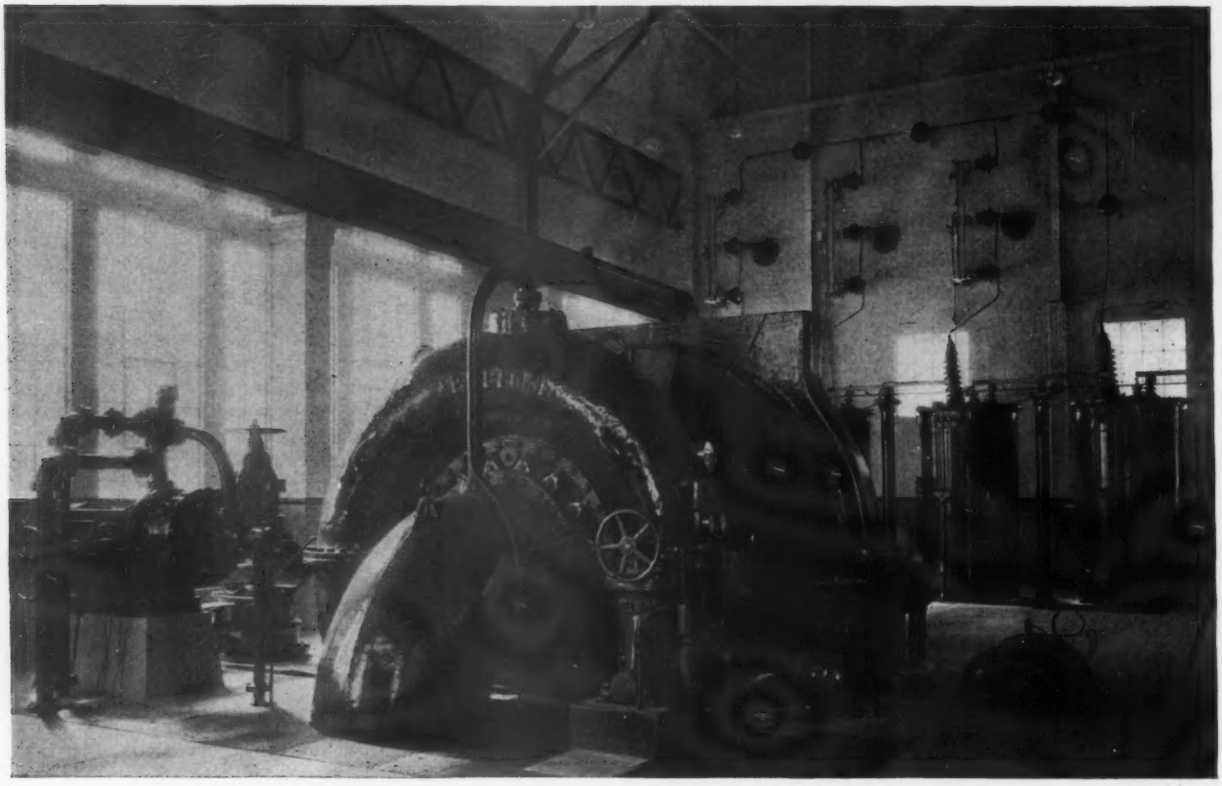
It would be an admittedly poor salesman who would seek to pass on to legal mandates the tasks of selling. There is as much excuse for doing that as there is for charging that rigid installation rules retard merchandise selling. Both "alibis" reflect upon the selling ability and the good faith of those who indulge in them. Let rules take care of minimum protection as they should. Let salesmanship take care of its real mission, the advocacy of quality and serviceability.

Commercial Development and Government Ownership

EXPERIENCE proves that commercial effort and government operation are incompatible. Public utilities are looked upon as fair game for government-ownership advocates when strictly commercial enterprises escape. Those who are anxious to place government in the light and power business see in it only a necessary and widespread public service. If they could be made to understand that the business grew to its present size, attained its asserted success, and continued to reduce its rates for service largely through the same kind of intensive commercial effort that has brought success to other industries, they would turn their arguments to other fields.

In short, if the public utility business could be lifted, in the eyes of the public, entirely out of the public service class and placed in the same category with enterprises considered to be of a more private and commercial character, agitation for government ownership and operation would decrease.

SPAULDING No. 3, the latest addition to the hydro-electric generating system of the Pacific Gas and Electric Company. This plant is unattended and fully automatic in its operation and was built to utilize the power head in a water supply developed by the Nevada Irrigation District. Its construction is indicative of a trend in hydro-electric practice which bids fair to make economically attractive the development of the many small plant sites on Western streams.



Irrigation WaterUtilized by

Automatic Hydro Plants

Co-operative Development of Water and Power by Electric Utility and Irrigation District Opens Field for Small Plants

By E. A. CRELLIN
Assistant Engineer, Division of Hydro-electric and Transmission Engineering, Pacific Gas and Electric Company, San Francisco.

MUTUAL BENEFITS accruing to all parties concerned where power and irrigation interests join forces in the full development of natural resources are emphasized again in the recent enlargement of the hydro-electric generating facilities in the plants of the South Yuba system of the Pacific Gas and Electric Company. In general, low-head or small-flow hydro-electric projects are not financially attractive in competition with the lower construction and operating costs of modern steam-electric generating stations. The storage and control of water for irrigation purposes, however, is a matter of increasingly vital importance to the advancement of agriculture and its related industries in the West. And it is through the co-operative development of available water supply that the economic balance is swung to favor the small automatic and semi-automatic plant. When the two uses for a given supply of water thus are combined, each interest is enabled to attend strictly to its own business and to avoid branching out into a by-product side line.

In May, 1924, the Pacific Gas and Electric Company entered into a contract with the Nevada Irrigation District under which the irrigation district agreed to deliver annually 108,000 acre-ft. of water into the Lake Spaulding storage reservoir of the power company. The power company, on its part, agreed to transport this water through its South Yuba and Drum canals extracting power en route and finally returning the water to the district for irrigation use. It is estimated that the district water used through the plants as at present constructed, together with additional natural flow which can be utilized, will generate an annual output of some 190,000,000 kw.-hr. For the use of this water the power company has agreed to pay the irrigation district approximately $370,000 annually. This amount will go a long way toward paying the interest and sinking-fund requirements on the bonds which were sold by the district to finance the cost of constructing the mountain diversion works.

The Nevada Irrigation District has constructed in Nevada County, Calif., a 65,000-acre-ft. storage reservoir known as Lake Bowman, from which water is delivered through a 220-sec.ft. conduit into Fuller Lake, one of the power company's small reservoirs. From that point a canal about a mile long conducts the water to the crest of the ridge above Lake Spaulding where it enters a steel penstock approximately 1,650 ft. long and 66 in. in diameter. An effective head of 309 ft. thus is developed for the operation of the generating unit in Spaulding power house No. 3.

SPAULDING No. 3

Spaulding No. 3 is a full-automatic plant containing a single 8,000-hp. horizontal-shaft Pelton Francis turbine driving a 7,000-kva., 6.6-kv., 450-r.p.m. Westing-

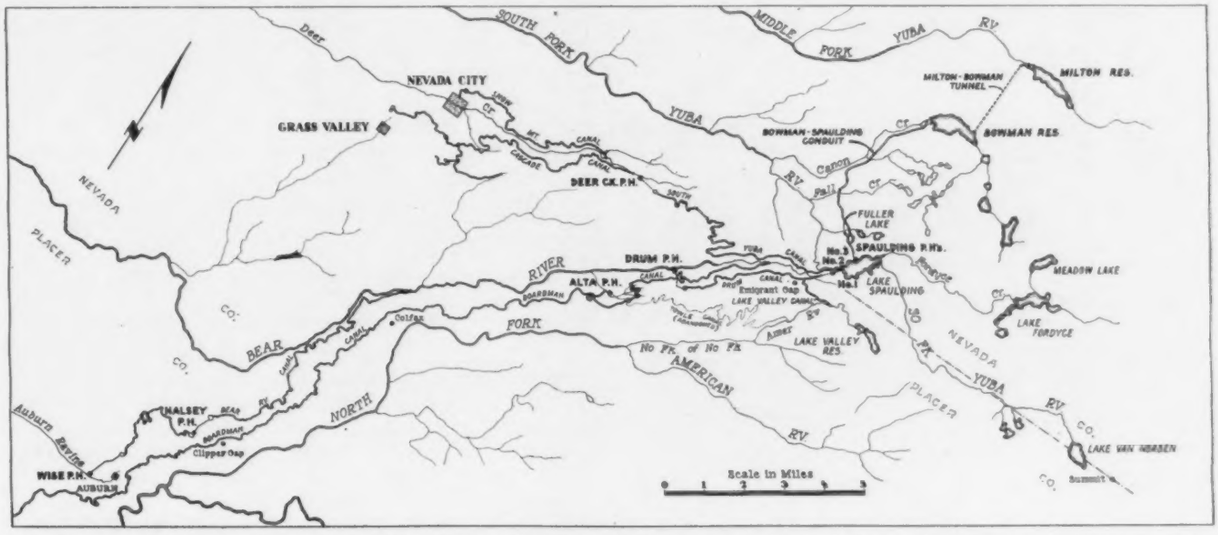


Fig. 1. Map showing major details of the Spaulding—Bear River—South Yuba system of the Pacific Gas and Electric Company.

Spaulding No. 3 penstock above the first anchor showing steel supports. The intake may be noted in the upper right background.

house generator. Power is transformed from 6.6 to 60 kv. through a bank of three 2,500-kva. transformers, and delivered to the 60-kv. bus at Spaulding power house No. 1 approximately a mile and a half distant.

Spaulding No. 3 generally will operate under continuous block-load and its output is fed into a relatively large system the frequency of which is held constant by a single governing hydro-plant. Under these conditions a governor is unnecessary on a unit as small as the one there installed, its only function being to shut down the unit and protect it against overspeed in case the generator is tripped off the line. The usual governor accordingly has been replaced by an "automatic hydraulic-turbine controller and shut-down device," operated by water pressure taken directly from the penstock. The controller consists of a cylinder containing a differential piston and a motor-operated jackscrew and is shown diagrammatically in Figs. 2 and 3. One side, "X," of the piston has approximately twice the area of the other side, "Y." The small-area side, "Y," of the piston is continuously subjected to penstock pressure which, acting upon the piston, tends to close the turbine gates. Pressure to the large-area side of the piston is controlled through a solenoid-operated self-restoring valve, "C," one position of which admits penstock pressure to the cylinder and the other position of which opens the cylinder to the drain.

When pressure is admitted to the large-area side of the piston the piston is caused to move against the lesser total pressure exerted by the pressure water on the small-area side of the piston, causing the opening of the turbine gates. Total motion of the piston in the opening direction is governed by a motor-operated jackscrew which is not mechanically connected to the piston, but which controls its position by pushing it in ordinary jackscrew fashion or by backing away to allow the water to move the piston in the other direction. The motor-operated jackscrew can be definitely controlled and adjusted for any load condition. Since the jack-

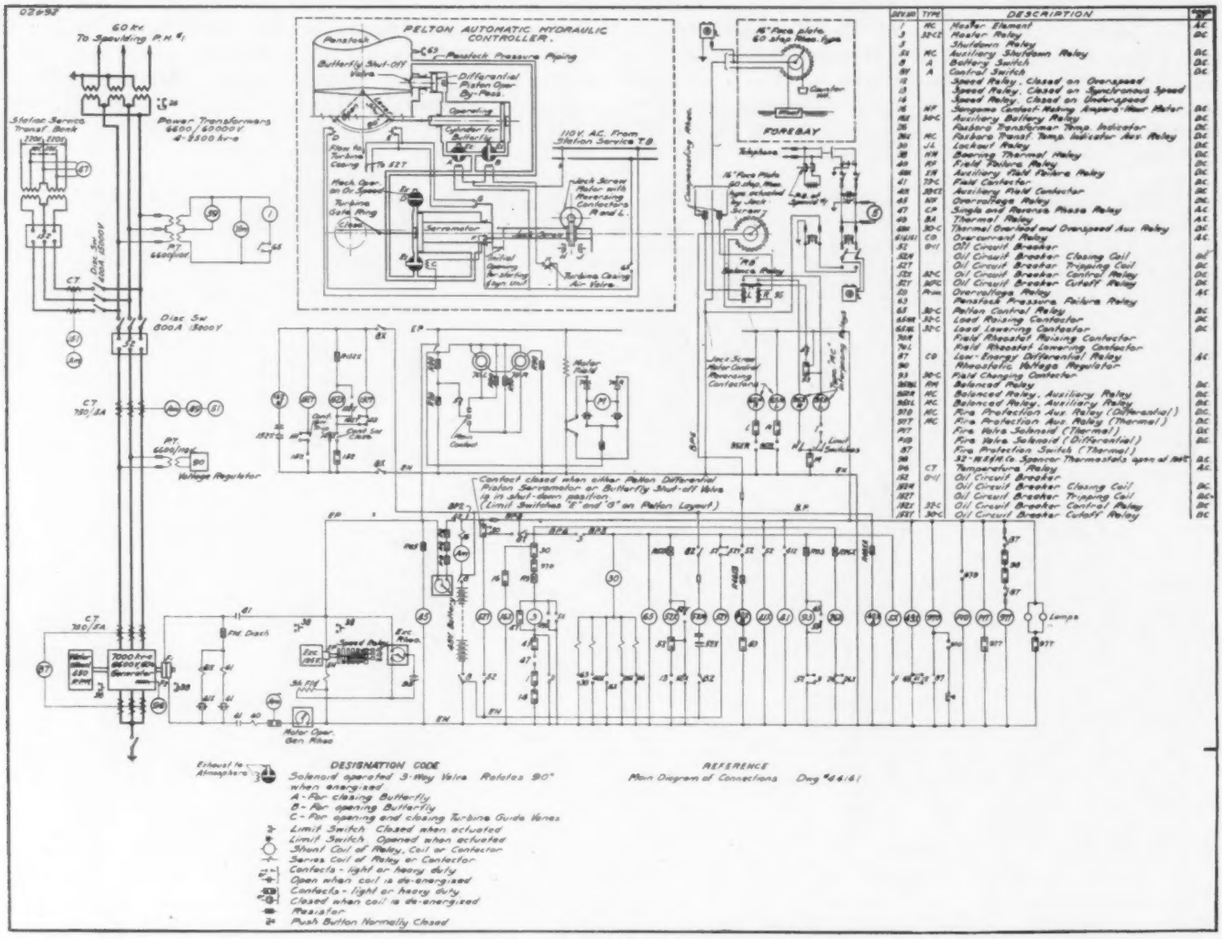


Fig. 2. Schematic diagram of control and related wiring through which may be traced the automatic operating sequence of Spaulding No. 3 power house.

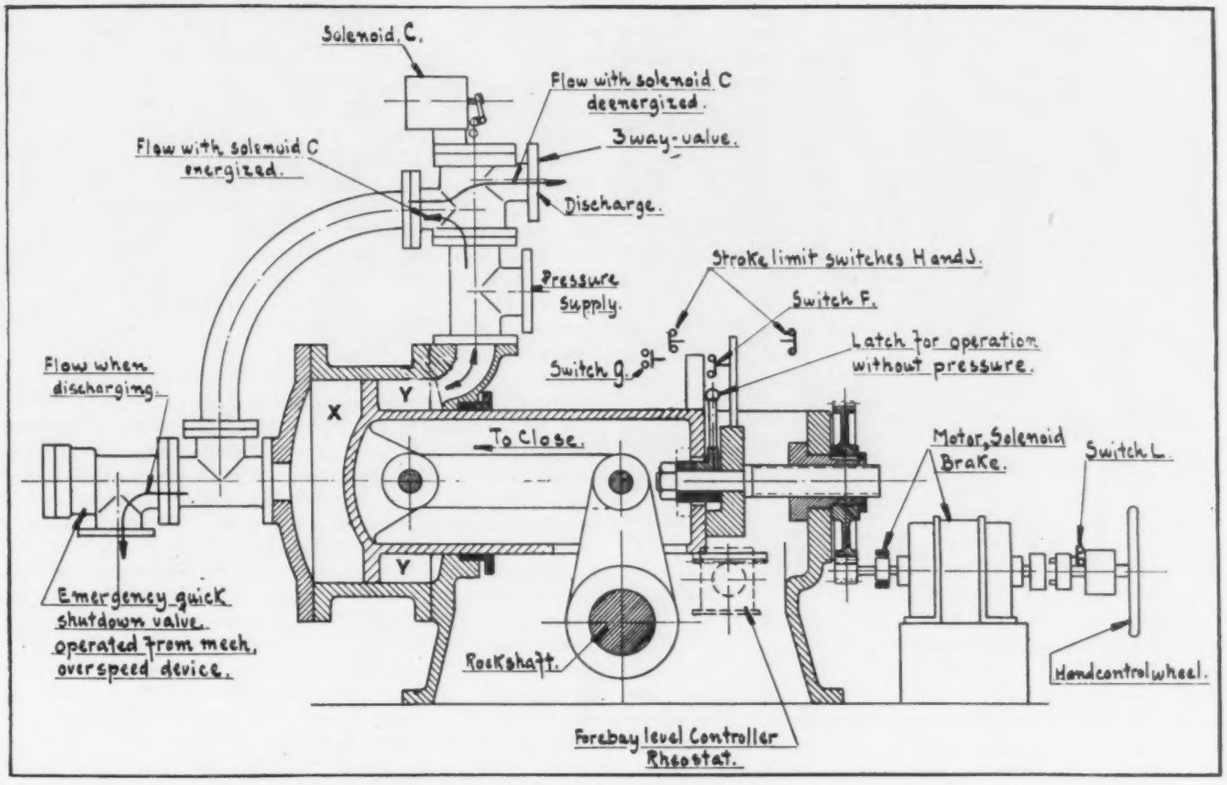


Fig. 3. Automatic hydraulic controller and shut-down device which constitutes the heart of the automatic equipment that controls the operation of Spaulding No. 3.

screw is not mechanically attached to the piston the turbine gates may be closed quickly by opening valve "C" to the drain, thus permitting penstock-pressure to operate against the small-area side of the piston to move it to the shut-down position.

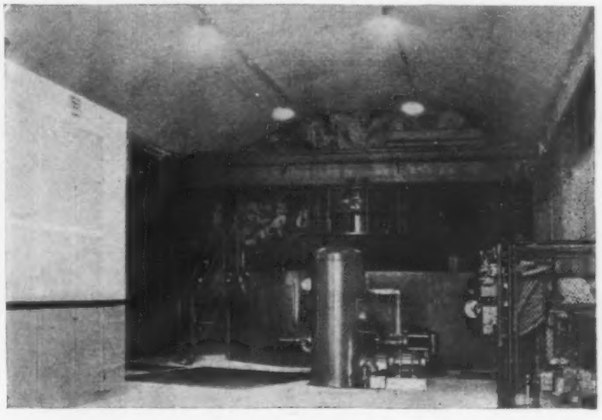
The main shut-off butterfly valve and its bypass valve also make use of a differential piston for their control. These are shown diagrammatically in Fig. 2. The smaller area of the bypass valve is subjected to penstock pressure tending to open the valve which will open when pressure is released from the large-area side of the piston through the operation of the solenoid-operated self-restoring valve "A." The cylinder for closing the butterfly and the bypass are interconnected, being closed and held closed by the same water. The opening of the butterfly is accomplished by the operation of control valve "B" which admits pressure water into the butterfly-valve operating cylinder.

While the plant is essentially a block-load plant, provision is made for following any fluctuations in water delivered to the penstock intake structure, by means of a water-level control equipment consisting of two face-plate-type rheostats and a balanced relay. These are interconnected and operate the jackscrew-motor of the hydraulic controller so as to adjust the load for any given water level which may be maintained by the flow in the canal.

In addition to the usual electrical overspeed tripping device the unit is equipped with a mechanical overspeed shut-down device set at about 10 per cent higher speed than that which should operate the electrical device and designed to operate in case of failure of the electrical equipment. It consists of a centrifugal element on the main turbine shaft which actuates a pilot valve to release pressure from the drain valve "D" (Fig. 2), allowing it to open and cause the hydraulic controller to close the turbine gates.

Spaulding No. 3 Operating Sequence

The foregoing description has covered the automatic equipment especially developed for this plant. Normal sequence of operations at Spaulding No. 3 as outlined in the following may be understood more clearly by reference to Fig. 3. Assume the plant shut down and not locked out by any protective device. Then the incoming 60-kv. line may be energized from Spaulding No. 1, causing the single- and reverse-phase relay No. 47 to pick up, in turn closing master relay No. 3 and energizing the control bus. Relay No. 65 then closes, energizing the solenoid on valve A which permits the



An adit hewn out of solid granite constitutes the generator room at Spaulding No. 1.

bypass valve to open and fill the turbine scroll case. As soon as the scroll case has filled, the air-release valve at the highest point on the scroll case seats, closing auxiliary switch "K" and energizing the solenoid of the main butterfly-operating valve "B."

As soon as the main butterfly valve has completed its opening stroke, auxiliary switch "D" closes to complete the circuit through the servomotor-operating valve "C." This permits the servomotor to move from the position of fully closed turbine gates to one-tenth gate opening at which point it is held by the position of the jack-screw.

At one-tenth gate opening the turbine starts and comes up to normal speed in approximately one and one-half minutes. When the turbine has come up to 96 per cent of synchronous speed a centrifugal switch (No. 13) on the end of the shaft closes its contacts, completing the circuit through the closing coil of the generator oil circuit breaker, No. 52, thus connecting the unit to the line. As soon as the generator oil circuit breaker closes, field contactor No. 41 closes putting normal field on the generator. Also, the circuit is completed through the forebay float control equipment and the unit automatically builds up to a load corresponding to the amount of water available at the forebay.

A more detailed description of the operation of this plant together with details of the protective features will be found in ELECTRICAL WEST for May 15, 1928, p. 428.

SPAULDING NO. 1 AND NO 2

Tail water from Spaulding power house No. 3 enters Lake Spaulding where it is combined with water from other sources for use through other plants in the Yuba system. A tunnel carries the water directly to Spaulding power house No. 1. This plant was placed in operation in December, 1917, and consisted of a single 3,750-kw. vertical generator installed in an adit cut from the solid granite cliffs of the South Yuba River Canyon. With the increased water available it became necessary recently to replace the original unit with a single vertical Pelton Francis turbine rated at 10,500 hp. under a maximum head of 196 ft. driving an 8,000-kva., 2.3-kv., 257-r.p.m. General Electric generator.

The only unusual requirements in this plant were those imposed by the low head room available in the adit chamber for assembling the unit. All equipment, including the crane itself, was specially designed to conserve vertical space. A two-story addition was built in front of the adit chamber to house the main transformer banks, the 60-kv. switching equipment and other apparatus.

In the winter season the Spaulding plants are buried in snow and it was throught best to put all equipment indoors. This was made necessary further by the rugged precipitous nature of the country which consists of steep granite cliffs that do not offer suitable yard areas for the installation of outdoor equipment. Tail water from Spaulding No. 1 is carried through a tunnel to the Drum Canal on its way to Drum power house.

Spaulding power house No. 2 is in the bottom of the South Yuba Canyon immediately below Spaulding No. 1 and draws its water supply from the tunnel supplying Spaulding No. 1 through a short tap-tunnel and a 48-in. penstock approximately 180 ft. long. The maximum effective head on the unit is 325 ft. This plant originally was placed in service in October, 1920, and there again it was necessary to provide extra capacity to utilize the additional water. The original 1,000-kw. turbine-unit was replaced by the 3,750-kw. General Electric generator removed from Spaulding No. 1, and a new 5,300-hp., 300-r.p.m. Pelton Francis turbine was installed to drive the generator. The plant is entirely unattended. It is controlled from Spaulding No. 1 switchboard in exactly the same manner as a unit in the same building would be controlled.

The main generator leads from Spaulding No. 2 are carried to the 2.3-kv. switch and bus structure at Spaulding No. 1 where the power is stepped up to 60-kv. through a bank of three 4,000-kva. transformers. Tail water from Spaulding No. 2 enters the South Yuba canal en route to Deer Creek power house, after which it is delivered back to the Nevada Irrigation District for irrigation purposes.

DEER CREEK

Deer Creek power house was converted recently to semi-automatic operation although the plant originally went into operation in May, 1908. It contains a single Pelton horizontal-shaft, double-overhung, impulse water

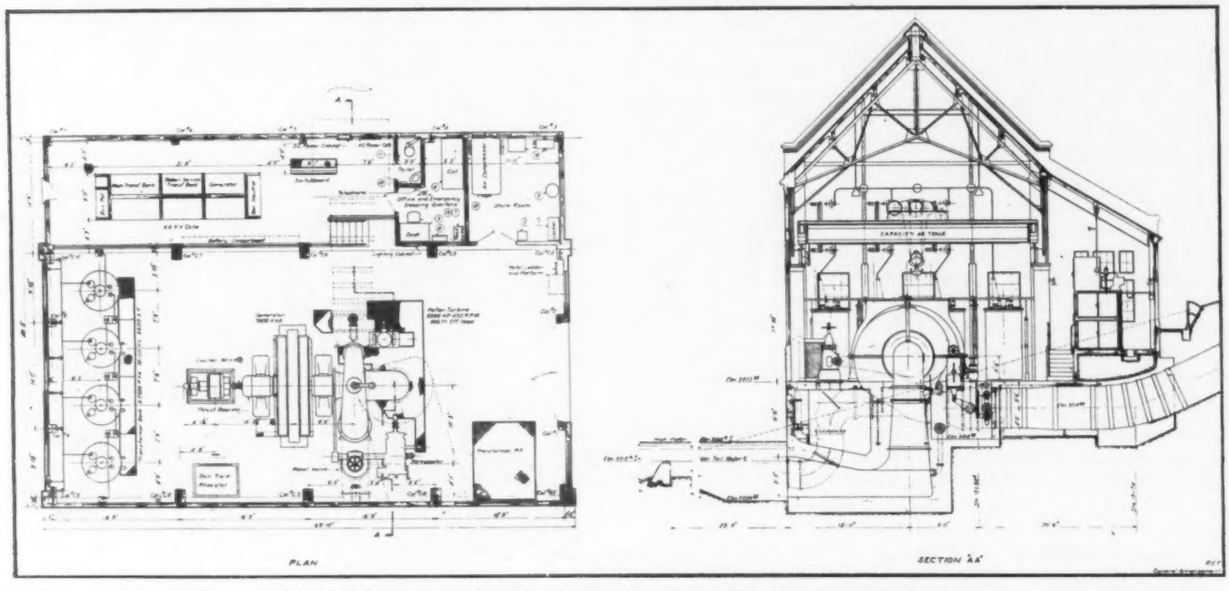


Fig. 4. Floor plan and sectional elevation of Spaulding No. 3 power house.

wheel rated 7,500 hp. at 300 r.p.m. under an effective head of approximately 800 ft. The original Westinghouse generator was rewound to increase its capacity to 6,875 kva. at 2.3 kv. and the original governor was scrapped and an hydraulic controller similar to the one described for Spaulding No. 3 substituted. In this case, the hydraulic controller operates to deflect the needle nozzles from the wheel, thus shutting down the unit in case of trouble. The same type of water-level control mechanism devised for use at Spaulding No. 3 causes the motor-operated needle nozzles to follow fluctuations in stream flow. The automatic electrical equipment is all standard, except that it is somewhat simplified by being semi-automatic in operation. Due to the age of the equipment it was not considered economical to convert the plant to full-automatic operation and consequently a resident operator attends the plant to start it up and parallel it with the system manually after a shutdown.

Increased water flow through Spaulding power house No. 1 necessitated enlargement of the Drum Canal to a capacity of 550 sec.-ft. and permitted the economical installation of the fourth generating unit in Drum power house. This unit consists of a single-overhung Pelton impulse wheel rated at 18,000 hp. at 257 r.p.m. under an effective head of 1,280 ft., driving a 15,000-kva., 6.6-kv. Allis-Chalmers generator. Power from Drum is stepped up for transmission over the 110-kv. network of the system. Power from the Deer Creek and Spaulding plants also feeds into Drum at 60 kv. where it is stepped up to 110 kv. for transmission to the load centers.

Spaulding No. 1 and No. 2. Note the "snowshed stairway" connecting the plants with the rim of the gorge.

Co-operative Development Attractive

After passing through the Drum power house units, the water flows down Bear River, ultimately passing through the Halsey and Wise power houses before being returned to the Nevada Irrigation District. This water originates in the high Sierra mountains at elevations above 5,000 ft. and after passing through the various power houses is picked up for irrigation purposes at an elevation of about 750 ft.

Co-operation between power company and irrigation district has made possible the maximum profitable use of the water. The power company has contributed its canal system for the transport of the water and has

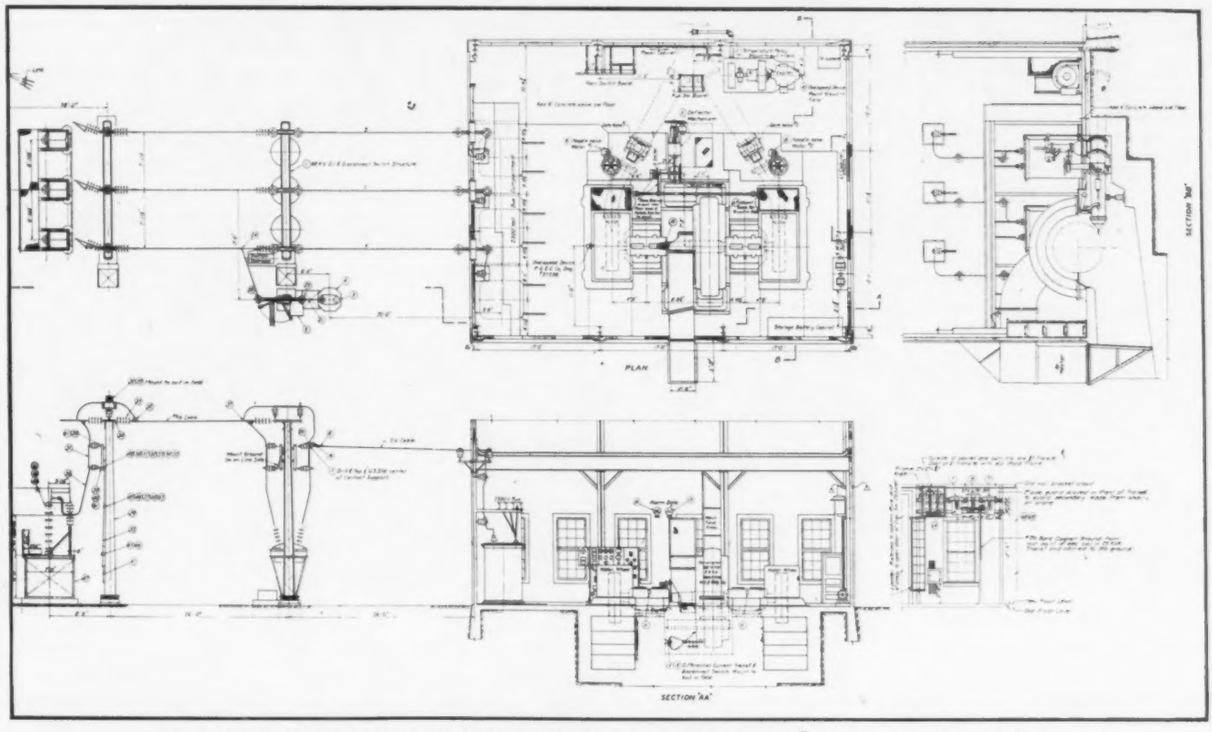


Fig. 5. Floor plan and sectional elevations showing general arrangement of Deer Creek power house.

taken advantage of the fall of the water to generate power. The irrigation district has developed the upper storage and diversion works and at the end of its journey to the low land areas again takes charge of the water for the benefit of agricultural districts.

Each utility organization is conducting its own business without side-line diversion of funds or man power, thus applying in the fullest measure the experiences gained in its own particular operating field. Such are the benefits of co-operation.

Policy and Future Conversions

In addition to the full-automatic Spaulding No. 3 plant and the semi-automatic Deer Creek plant described in this article, the Pacific Gas and Electric Company also has a semi-automatic plant in its Coal Canyon power house. Semi-automatic plants are started manually and are then left to operate by themselves. A resident operator is in charge and his only duty aside from routine cleaning and maintenance is to put the plant back into service when it has been tripped off the line through the operation of some protective device. Full-automatic plants are unattended and start and stop upon a signal from some remote point. They are visited periodically for cleaning and maintenance.

Many of the older plants on the company's system contain relatively small generators and their annual output in kilowatt-hours is small enough so that the expense of maintaining a full staff of operators for continuous attendance at the switchboard represents a fixed charge which bears a high ratio to the total possible plant revenue. Such plants are adapted admirably to conversion to semi-automatic operation, thus effecting a great saving in operating costs. They are not, in general, economically suited to conversion to full-automatic operation because of the design of the equipment which was installed originally for manual operation and which is not readily convertible to full-automatic control. Semi-automatic operation, however, is economically feasible and it is the policy of the company to convert these older plants to semi-automatic operation from time to time as the necessity for overhaul and rehabilitation makes reconstruction desirable. Work is now progressing on the conversion of Bullards Bar and Cow Creek power houses to semi-automatic control and it is expected that these will be followed immediately by the conversion of South and Lime Saddle power houses.

Automatic and semi-automatic control of power houses long since has passed the experimental stage. Many plants throughout the country are in successful operation and have proved the reliability of the equipment designed for their control. The cost of automatic control equipment represents only a slight increase in the first cost of the plant and, where attendance is not required for other reasons, the operating personnel thus may be reduced to a minimum with a corresponding reduction in operating expenses.

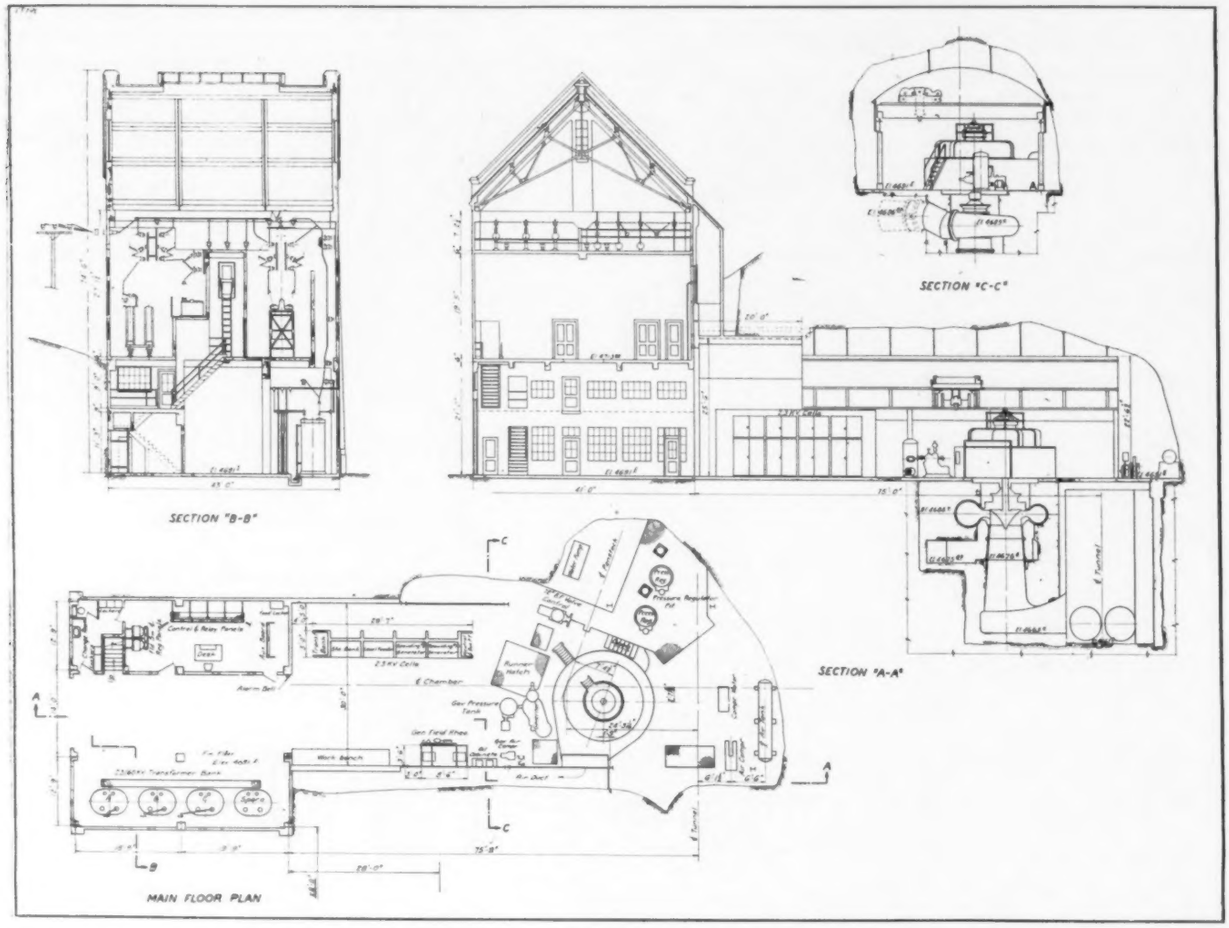


Fig. 6. Floor plan and various elevations of Spaulding No. 1 power house. As indicated, a major portion of this unusual power house is underground in an adit cut from the solid granite cliffs of the South Yuba Canyon.

Herbert Hoover—*Engineer*

By Louis F. Leurey*
Consulting Engineer; President, Engineers' Club of San Francisco

ENGINEERS have reason to be proud of Herbert Hoover on two counts: first, as a man, and second, as an engineer and as a distinguished member of one of the great professional engineering societies. As a man there is every reason to be proud of our new President because few Presidents start life from as humble beginnings as did Herbert Hoover. There are engineers in these Western states associated with him in his early professional efforts who know the real handicaps under which he labored and who honor him for the manly way in which these handicaps were overcome in his rise to fame. There are, in California, engineers who assisted in training the young mind of student Hoover and gave him that fundamental knowledge and those ideals that have led him to the White House.

Herbert C. Hoover, Thirty-first President of the United States

So for California engineers there is a close personal note in celebrating Herbert Hoover's inauguration. Beyond the feeling of pride in his great achievements, both technical and as a public servant, there rises a special pride founded on the fact that whether it be in the handling of a mining property the feeding of a stricken nation or the administration of a great governmental department, he has always conducted himself with the dignified, scientific and unselfish attitude which engineering training and engineering ideals have always instilled in our profession.

Our pride in Herbert Hoover's inauguration, however, goes beyond the personal note, and reaches a higher and more important basis when we consider Herbert Hoover the engineer and the effect that his engineering training has had and will have upon the affairs of the nation and the affairs of the world. In the golden days of California's statehood the bonanza wealth of her mines went to our Eastern seaboard where it financed the embarkation of our nation on a program of industrial activity new to an agricultural nation. This industrial movement, initiated and accelerated by California gold, whether for weal or for woe, has in the intervening years changed the entire fabric of American civilization and from a nation almost wholly agricultural, and a debtor to the world, we have become the world's greatest industrial nation.

No body of professional or business men has contributed more to this evolution than have the professional engineers, who, applying the laws of science to the design and construction of works, have perfected an industrial machine whose operation is becoming increasingly complex with the passage of time, and upon whose accurate functioning the whole prosperity of our nation depends. By a curious cycle of events California, which exported the gold to our Eastern seaboard that started this industrial revolution, has now sent one of her sons, a product of her educational and engineering ideals, to guide the great machine which is the result of this early circumstance.

No more striking contrast for denoting the extraordinary changes in our civilization can be found than to compare the first President of our country—an engineer by profession, who was inaugurated in 1789—with the thirty-first President—an engineer by profession, who is inaugurated in this year 1929. In the days of Washington engineering was almost exclusively a matter of simple land surveying; today it covers the scientific guidance of almost every activity upon which human welfare depends. In the one hundred forty intervening years the professional engineers have concentrated mainly upon technical problems, and largely through the efforts of the five great engineering societies have perfected professional technique, to a point almost beyond belief, by the most thoroughly co-ordinated system for the exchange of technical information that has ever been devised in the world's history.

The engineer today, however, is entering upon a new era. The world war with its insatiable demand for instant results developed the fact that men with engineering training who had executive capacity were adapted to almost any task given them and could produce quick and positive achievements without seeming preparation. No man in the world's history has demonstrated this capacity to meet unexpected situations with positive action and successful achievement as has the man who has but now been inducted into the Presidency of our nation.

Our President has dramatized to the people the inherent capacity of the engineer for important administrative positions and the public welcomes with open arms a further entry of the engineer into the realm of business and of administrative effort.

*Based upon an address delivered at the Hoover Inauguration Day Dinner of the San Francisco Engineers' Club, March 4, 1929.

Three-lamp post used in new Seattle street lighting installations.

Analysis of Street Lighting Installation Costs in Seattle

By GLEN SMITH
Engineer of Construction, City Light Department, Seattle.

Two-lamp bronze post used in new Seattle lighting installations.

THE City of Seattle recently placed in service one of the most extensive and in some respects the finest decorative street lighting system in the country. Practically the entire business district is covered by the new high intensity lighting which serves altogether ten miles of downtown streets. The outstanding features of the new system, aside from its extent, are the high and even illumination provided on the street, the beauty of the posts, which are bronze on the outside, and the provisions that have been made for increasing the intensity at some future date if desired.

The new installation repaces five-lamp standards that were installed in 1908. The old system consisted of 14-ft., 3-in. cast iron posts originally fitted with five 50-watt, 8-volt lamps fed from transformers in the pole base. An intensity ranging from .32 to .79 foot-candles was secured. Later the original sanded globes were replaced with opal globes and the wattage of the lamps was increased to 100.

In contrast to the low iron posts with five small lamps, the new standards are 23 ft., 8 in. to the top lamp and are equipped with 500-watt lamps so that the three-light standard carries 2,820 cp. and the two-light standard 1,880 cp. The minimum intensity of illumination on the street is .96 foot-candles. Provision is made in the wiring and transformers to double the wattage of the system and all two-lamp standards may be changed to three by replacing the center cap with a third fixture.

The new system consists of three installations, one on First Ave., one on Union St., and one on Third Ave. On First Ave. an average spacing of 73 ft. is used with posts opposite. The average spacing on Union St. is 82 ft. and on Third Ave., 72.5 ft. The standards all have bases and tops of cast statuary bronze with shafts of rolled bronze. The Union Metal Manufacturing Company furnished 538 standards of rolled bronze over a rolled steel shaft. NePage McKenny Company made the remaining 823 posts, consisting of a bronze shell filled with reinforced concrete.

On Union St. and Third Ave. the luminaire employed is the General Electric No. 124 light, alabaster type with rippled globe. On First Ave. the "Olympian" luminaire made by the Line Material Company is used. Both types of globes have decorative bronze casings dividing the globe into four panels.

The new lighting system was installed at the expense of owners of abutting property in accordance with the local district improvement plan. The completed system is maintained and operated by the City Light Department. The three installations comprise 1,361 standards providing illumination for 51,000 ft. of streets. The total cost was $806,640.87, or an average cost of $594.15 per post. This cost was levied against 89,786 ft. of assessed property, or an average cost of $9.01 per foot assessed.

As a result of the new installation Seattle now has 1,317.27 miles of lighted streets. The street lighting distribution system comprises 783.82 miles of overhead system and 45.62 miles of underground system. The accompanying table gives detailed cost figures of the new installations. Final figures for two installations are subject to slight adjustment.

Second Ave. looking south from Stewart St., showing new Seattle street lighting installation.

Unit Costs of Three Seattle Street Lighting Installations

	First Avenue Installation	Union Street Installation	Third Avenue Installation
Bonds	12 year 5%	12 year 5%	12 year 5%
Contractor	NePage McKenny Company	NePage McKenny Company	C. B. Campbell Company
Property frontage assessed	37,200 ft.	18,295 ft.	34,291 ft.
Lineal feet of street lighting	21,000 ft.	10,500 ft.	19,500 ft.
Number of two-lamp posts	395	159	401*
Number of three-lamp posts	171	98	137*
Total number of posts	566	257	538
Type of post	Type D, Alternate A (Concrete Filled)	Type D, Alternate A	Type D, Alternates B and C
Fixed engineering charge	$10,000	$5,500	$8,500
Accounting and collection charge	850	436	905
Advertising charge	70	69	70

BID PRICES	Quantity	Unit Price	Total Cost	Quantity	Unit Price	Total Cost	Quantity	Unit Price	Total Cost
Type D, Alternate A posts	566	$171.42	$ 97,023.72	257	$199.00	$ 51,143.00	..	..	..
Type D, Alternate B posts	..	..	..	..	..	..	457	$237.00	$108,309.00
Type D, Alternate C posts	..	..	..	..	..	..	81	175.90	14,247.90
Two-lamp post furnishings	395	191.81	75,764.95	159	192.35	30,583.65	518	169.60	87,852.80*
Three-lamp post furnishings	171	226.63	38,753.73	98	227.90	22,334.20	20	205.20	4,104.00*
Manholes	11	190.00	2,090.00	9	200.00	1,800.00	17	225.00	3,825.00
Handholes	..	..	..	..	..	..	22	37.50	825.00
Conduit, 3½ in. in place	..	..	..	..	..	..	1,600 ft.	1.05	1,680.00
Conduit, 3 in. in place	..	..	..	..	..	..	260 ft.	.85	221.00
Conduit, 2 in. in place	31,000 ft.	.463	14,353.00	15,350 ft.	.408	6,262.80	28,450 ft.	.60	17,070.00
Conduit, 1½ in. in place	1,800 ft.	.388	698.40	..	..	..	2,750 ft.	.50	1,375.00
Conduit, 1 in. in place	1,800 ft.	.189	340.20	760 ft.	.188	142.88	1,370 ft.	.40	548.00
300,000-c.m., 5,000-volt, 3-conductor lead cable	650 ft.	1.88	1,222.00	..	..	..	3,250 ft.	1.75	5,687.50
4/0 5,000-volt, 3-conductor lead cable	..	..	..	1,980 ft.	1.436	2,843.28	900 ft.	1.50	1,350.00
No. 2 5,000-volt, 2-conductor lead cable	1,250 ft.	.562	702.50	..	..	..	880 ft.	.72	633.60
No. 4 5,000-volt 2-conductor lead cable	1,450 ft.	.50	725.00	..	..	..	2,200 ft.	.85	1,870.00
No. 6 5,000-volt, 2-conductor lead cable	660 ft.	.474	312.84	4,000 ft.	.456	1,824.00	..	..	..
No. 4-4-6 600-volt, 3-conductor lead cable	12,300 ft.	.271	3,333.30	5,350 ft.	.284	1,519.40	15,700 ft.	.37	5,809.00
No. 6-6-8 600-volt, 3-conductor lead cable	22,700 ft.	.247	5,606.90	11,200 ft.	.23	2,576.00	15,250 ft.	.30	4,575.00
No. 16 10-pair paper-lead cable	..	..	..	..	..	..	2,700 ft.	.30	810.00
Removing existing cable	7,900 ft.	.0228	180.12	3,100 ft.	.0345	106.95	11,700 ft.	.01	117.00
Secondary cable re-used	5,300 ft.	.047	249.10	1,600 ft.	.049	78.40	5,600 ft.	.15	840.00
75-kw. transformers	15	547.00	8,205.00	6	558.51	3,351.06	17	665.50	11,313.50
50-kw. transformers	8	487.40	3,899.20	9	498.75	4,488.75	12	553.30	6,639.60
37.5-kw. transformers	3	418.70	1,256.10	..	..	..	6	491.70	2,950.20
25-kw. transformers	1	334.96	334.96	..	..	..	1	408.10	408.10
15-kw. transformer	1	261.26	261.26	..	..	..	..	..	..
Moving 25-kw. transformer	..	..	..	..	..	..	1	74.20	74.20
Oil fuse cutouts	64	53.35	3,414.40	30	53.30	1,599.00	84	59.85	5,027.40
Concrete post foundations	200 cu. yd.	16.77	3,354.00	165 cu. yd.	12.95	2,136.75	310 cu. yd.	15.00	4,650.00
Removing and patching old post foundations	35	4.31	150.85	77	4.31	331.87	34	10.00	340.00
Street signs (double)	74 sets	20.70	1,531.80	33 sets	20.40	673.20	102 sets	21.50	2,193.00
Street signs (single)	3	11.75	35.25	2	12.06	24.12	6	11.00	66.00
4-in. manhole drain	350 ft.	1.69	591.50	315 ft.	1.79	563.85	550 ft.	2.50	1,375.00
Primary connection charge to be paid Light Dept.			7,535.00			4,510.00			7,600.00
Cash payment per specification			3,280.00			1,520.00			2,800.00
Credit from the sale of existing transformers			320.00			60.00			221.00
Total			$286,445.08			$146,358.16			$316,335.50
Interest and incidentals			23,310.00			10,950.00			25,520.00
Total bids as per specifications			$309,755.08			$157,308.16			$341,855.50

Assessed valuation of property	$21,266,450.00	$6,133,570.00	$18,031,950.00
Final cost of improvement	301,385.58	158,905.40†	348,349.89†
Cost per front foot assessed	8.10	8.73	10.28
Date bids were opened	March 16, 1928	April 13, 1928	February 17, 1928
Time to complete job	150 days	120 days	150 days
Date installations were accepted	January 4, 1929	November 16, 1928	January 15, 1929

*117 2-light posts on Third Ave. were changed to 3-light posts after bids were let.
†Final cost of Third Ave. and Union St. installations subject to slight adjustment.

Total for Three Improvements

Number 2-lamp posts	955
Number 3-lamp posts	406
Total number posts	1,361
Total feet assessed	89,786
Total feet lighting system	51,000
Total cost	$808,640.87
Average cost per post	$594.15
Average cost per foot assessed	$ 9.01
Average cost per foot of system	$ 15.86

Some Advantages of the Electric Furnace for Heat Treating

By P. C. KELLY*
Westinghouse Electric & Manufacturing Company, Mansfield, Ohio.

PROBABLY no single branch of industrial electric heating has grown at a more rapid rate than heat treating with the electric furnace. The actual sales, expressed in connected kilowatts, of a number of the larger electric furnace manufacturers increased from 1920 to 1927 from 10,000 to 55,000 kw. per year, or five and one-half times. The increase from 1924 to 1927 was from 15,000 to 55,000 kw. per year, or three and one-half times. Such rapid and sustained growth can only mean that the users of heat treating furnaces are realizing more and more the practical advantages of electricity as the ideal heat source.

Any justifiable contribution to industrial progress in the way of a machine or plant equipment must accomplish one or more of the following results:

1. Cost less to operate.
2. Have a lower first cost.
3. Require less labor to operate.
4. Require less maintenance.
5. Increase production.
6. Reduce the amount of rejects.
7. Produce a better product.
8. Result in better working conditions.
9. Give a definite final cost for producing a definite quality product.

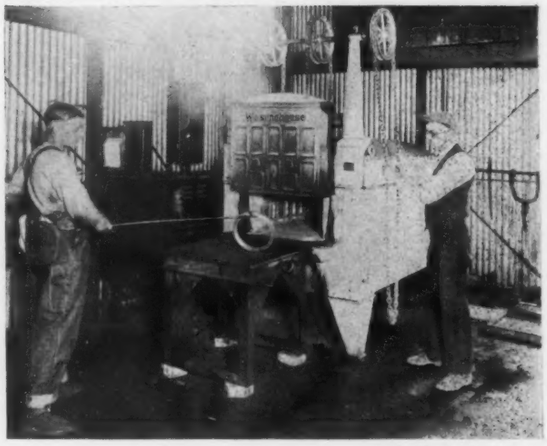
It is generally recognized in the art of heat treatment that for every product treated there is (1) some best rate of heating, (2) some best final operating temperature, (3) some best period of time for heat saturation, and (4) some best rate of cooling. The nearer one approaches these ideal conditions, the better and more valuable will the finished product become. The farther one departs from them, the less valuable and more inferior the product.

Electric heat has found its application and general acceptance in plants desiring to accomplish one or more of the following things: (1) reduce labor, (2) reduce maintenance expense on equipment, (3) increase production, (4) reduce rejected parts, (5) improve the product, (6) improve working conditions, and (7) permit the determination of a definite final cost for producing a definite product.

From this it is evident that electric heating finds its greatest use in more progressive and up-to-date plants, where something worthwhile is required, and where the main consideration is not to find a cheaper fuel or less expensive shop equipment.

It might be well to point out that the fuel may influence but does not determine the cost of a completed article. The fuel cost may be only 1 per cent of the factory cost, whereas rejected parts, labor of handling such parts, additional equipment made necessary in order to reach a specific production, and additional testing and inspection may increase the factory cost as much as 15 per cent.

Assume in the above case that the cost of electricity would be double that of fuel but the rejects in the case of electric heat would be reduced to zero. The factory cost would be reduced 13 per cent by the use of electric heat. Of what importance, therefore, is the cost of electricity as compared with the cost of fuel? It would not pay to use fuel for heating purposes in many applications in industrial plants if the user obtained his fuel for nothing.



General heat treating of oil well parts at the Emsco Derrick & Equipment Company's plant, Los Angeles.

The Manufacturers' Association of Connecticut, in co-operation with the Electrical Engineering Department of Yale University, recently made a survey of ten electric furnace installations in New England. This survey developed that as a result of the electric furnace 90 per cent of the users have lowered labor costs, 70 per cent have increased production, 60 per cent have lower maintenance costs, 50 per cent have reduced over-all costs, and 50 per cent have eliminated rejections.

H. E. Martin, assistant metallurgist of Dodge Bros. Inc., said in a recent article:

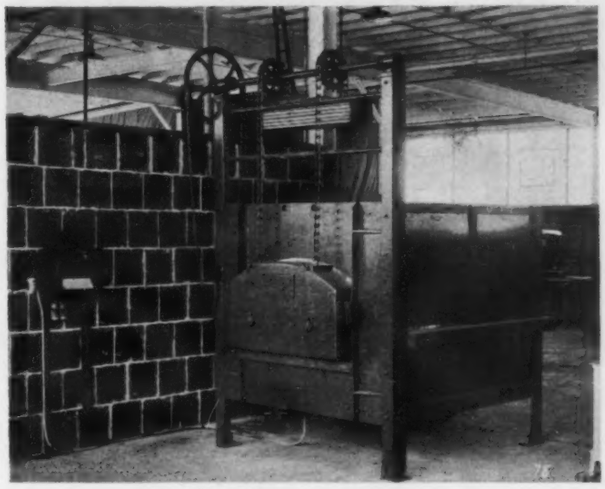
> Ninety-five per cent of all heat treating operations in the production of Dodge motor cars is now or will be carried out in electrically heated furnaces by Feb. 1, 1929, and I am safe in predicting that in the near future the total will be 100 per cent. Why? Briefly the reasons are as follows:
>
> 1. Quality of product.
> 2. Control—temperature—setting on recording pyrometers regulates current input.
> 3. Maintenance.
> 4. Improved working conditions, that is, absence of smoke and heat.
> 5. Low rejections maintain high production schedules.
> 6. Automatic operations simplified.
>
> As each unit is later reviewed, the control of uniformity of the product will either be shown or proved by production figures. Maintenance costs over a period of three years are greatly reduced due to lack of excessive temperatures such as exist in the combustion chambers of gas or oil-fired furnaces.

There are today suitable electric furnaces available for almost any kind of heat treatment, particularly for temperatures not in excess of 1,850 deg. F. An idea of the wide ranges of sizes and types which have been built and are available may be obtained from a review of the line as manufactured by the Westinghouse company. For example, the company builds small box furnaces with a chamber size about 6 in. long by about 3 in. wide for the production of artificial teeth. In addition the company has in successful operation a counter-flow conveyor furnace over 126 ft. long for the firing of porcelain enamel on sheet metal parts. This latter furnace has a production capacity of over 3,000 sq.ft. of work per hour.

The electric furnace manufacturers have been criticized at times by potential users of their products because of the apparent lack of definite figures applying to furnace life, maintenance, and possible over-all cost of production. It should be borne in mind that the larger proportion of electric furnace installations have

* Excerpts from a paper before the Western Metal Congress, Los Angeles, Jan. 14-19, 1929.

been made since 1924, and four years is hardly sufficient time to get real data on furnace life. In addition, many customers are getting such remarkable results



Heat treating furnace with control panel in use at the General Aluminum Products factory in Los Angeles.

that they are reluctant to allow the furnace manufacturer to publish or use the figures available. As evidence that over-all costs are being reduced, both in batch and continuous electric furnaces, the following instances are cited:

Economies in Treating Hand Tools

A prominent manufacturer of hand tools in a district where natural gas is available at 18 cents per thousand cu.ft., after a short period of experimentation about four years ago, installed 23 electric lead bath furnaces for hardening and tempering, and four low-temperature ovens. The installation totaled over 1,550 kw. in connected capacity and represented an investment of approximately $100,000. Gas furnaces of the lead bath and box types were supplanted. Electric energy is obtainable at approximately 1 cent per kw.-hr. After four years of operation it is interesting to compare the results obtained and the savings accomplished:

With the Gas Fired Furnaces:

The vessel life was from 2 to 6 weeks, or approximately 300 operating hours.

Rejects ranged from 15 to 25 per cent.

Experienced heat treaters were required to obtain a 75 per cent acceptable product.

Thirty-nine men and 6 boys were required for the heat treating department.

Working conditions were influenced by fumes and heat.

The lead loss was high.

Scrap losses in the box furnaces varied up to 20 per cent and in the lead baths up to 15 per cent.

With the Electric Furnaces:

The vessel life in the hardening baths at approximately 1,600 deg. F. averaged 5,100 hours, or approximately 24 months.

In the small tool hardening baths, at approximately 1,600 deg. F. only one vessel failure occurred at the end of 7,743 hours, with a maximum of 8,949 hours, or an average of 6,162 hours for 9 furnaces.

In the six tempering baths operating up to 1,200 deg. F. there has not been a vessel failure during the four years.

The maintenance expense on electric furnaces is less than one-tenth of the former maintenance cost.

Heating element replacements have been practically negligible.

Rejects are reduced to practically zero.

Only thirteen men are employed in the heat treating department.

Unskilled labor is used to obtain an approximately 100 per cent acceptable product.

Uniform results are obtained.

Working conditions are improved.

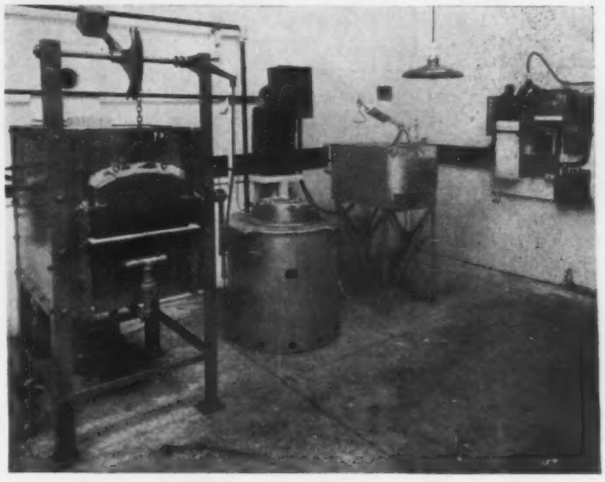
Complaints from distributors and users are practically eliminated.

Lead consumption is about one-eighth of the previous consumption.

Scrap losses are practically nil.

It is interesting to note that the distributors state that they did not believe it possible to secure such an excellent product. One distributor carefully tested each ax received by submitting it to a wire-cutting test, that is, cutting a steel wire at three different points on the cutting edge of the ax.

Out of a carload of 5,400 double-bladed axes, or an equivalent of 10,800 single-bladed axes, there was not a single reject—a condition only obtainable with controlled electric heat.



Electric pot furnace and an electric box furnace installed at the plant of the Hyspeed Tool & Steel Company, Los Angeles.

Treating Ball Bearing Races

In the fall of 1926 a large manufacturer of ball bearings installed an automatic discharge type rotary hearth furnace for hardening ball bearing races with the following results:

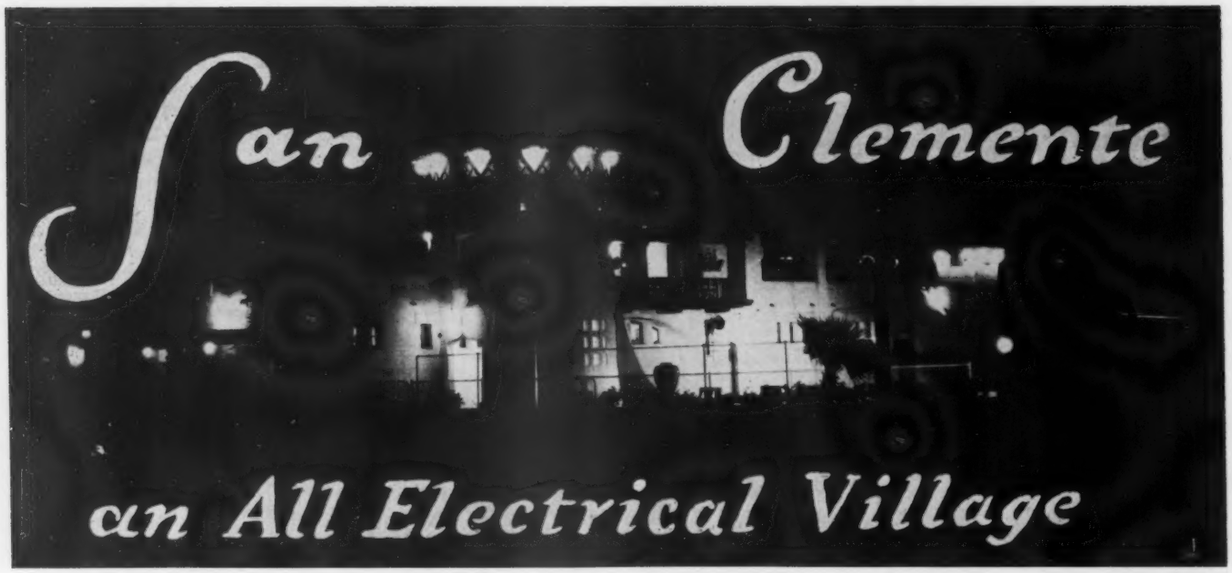
Five men less are needed in the hardening room.

The work is discharged directly from the furnace to the quench.

Pieces are hardened very uniformly—a test count showed 10,000 consecutive pieces without a single rejection.

Although the same standards of inspection are maintained, one inspector is required instead of three as used previously. This is because of the exceptionally uniform results.

This summarizes briefly some of the advantages of electric heat as applied to heat treating furnaces and points out some of the economies achieved in two individual instances. New and remarkable things are being accomplished daily through the application of electricity as a source of heat. It is the writer's belief that the next few years will bring about an almost universal adoption of electricity as an ideal source of fuel for heat treating furnaces.



The beach clubhouse, floodlighted at night, invites passersby on the main highway to its illuminated swimming pool.

FROM a stormy career as mayor of the city of Seattle during one of its severest crises to becoming the founder and developer of one of the Pacific Coast's most restful and lovely communities has been the fate of Ole Hanson. San Clemente, just south of San Juan Capistrano on El Camino Real, the coast highway to San Diego, is his new creation. And electricity is its sole means of lighting, of power, of heating—by choice.

In fact, San Clemente is known as the 100 per cent electrical city. Its streets, winding over hills overlooking the Pacific Ocean, are all well lighted. Many of its important buildings, such as the beach club, the hotel, the community club, the hospital and some of its homes are either floodlighted or lighted ornamentally from special standards and brackets.

According to the San Diego Consolidated Gas & Electric Company, which serves this all-electric community, San Clemente is its largest user of electric air heating. Hotel San Clemente, with every room individually heated by electricity, has a connected load of 123 kilowatts. The residence of H. H. Cotton comes next with 82 kilowatts. The San Clemente school has a load of 62 kw. in air heating.

In fact, the average commercial connected load—in hotels, offices, public buildings, stores, shops, etc., is 40 kw. The residential load averages 20 kw.

San Clemente's hospital, in reality a desirable convalescing hotel, is likewise equipped with electric appurtenances and equipment necessary to modern medical demands. It has X-Ray and other therapeutic electrical devices, a fully equipped dental laboratory and kitchens electrically equipped. Since every room is finished in color and everything is done to make it homelike rather than institutional, lighting plays an important part in its artistic scheme.

Ralph Swigart, proprietor of San Clemente's electric shop, is established on the main highway in an attractive building which acts as show room for radio, ranges, heaters and appliances, and on a lower floor level is his home, and finally his shop. He takes a prominent part in civic affairs and is helping to keep up the city's electrical reputation by selling more electrical appliances and equipment.

The most recent electrical feature is the illuminating of the 1,200-ft. fishing and pleasure pier. The lighting is accomplished by means of ornamental standards fashioned of copper in a lantern type. As other projects are developed in this unique community these too will be electrical without doubt. No other form of fuel or power offers to this spotless little city such cleanly and desirable energy for its heating, cooking, lighting and power.

The community clubhouse overlooks the ocean and the extensive tract of electrical homes.

Typical Homes

The Hotel

Plaza & School

The Beach Club

The Electric Shop

Advantages of

Electric Heat in a Newspaper Plant

By E. E. SCOFIELD
Industrial Engineer, The Washington Water Power Company, Spokane.

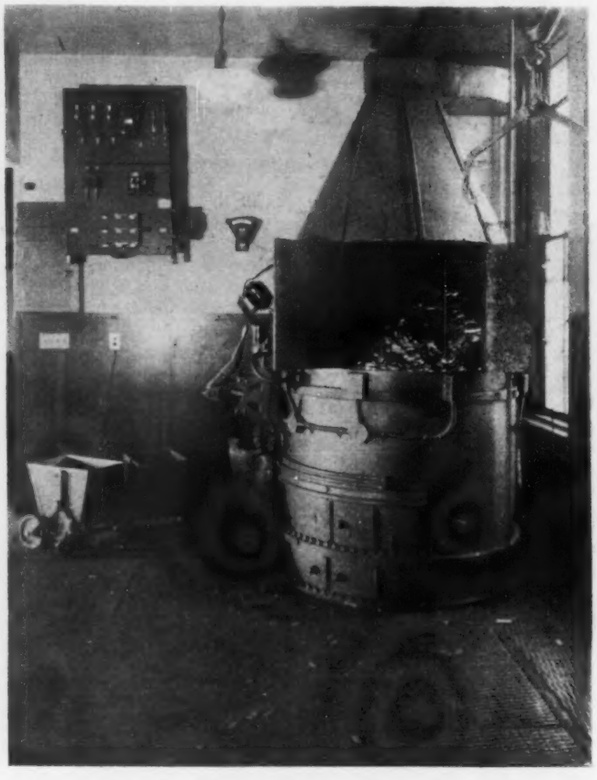
Satisfaction is expressed by owners after year's operation of three melting pots aggregating 120 kw. of connected load. Economy and better working conditions among advantages claimed for electrical installation.

A 5-ton, 60-kw. stereotype pot in the Cowles Publishing Company plant in Spokane.

FOLLOWING more than a year's experience with electrically heated stereotype pots, the Cowles Publishing Company, of Spokane, publishers of the *Spokesman-Review*, the *Chronicle* and the *Washington, Oregon, Idaho Farmer*, expresses complete satisfaction with the operation of the equipment and is highly enthusiastic over the advantages of the electrical installation as compared with fuel-fired melting pots. The electrically heated equipment was installed early in 1928 when the publishing company moved into a new building where it publishes a morning and evening paper with a combined circulation of approximately 100,000 daily.

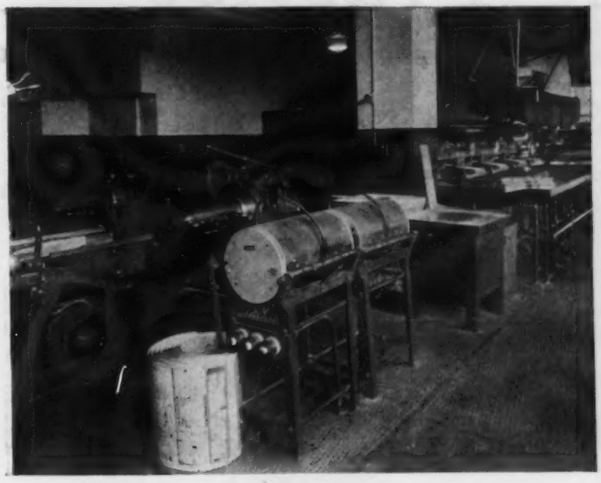
After investigating several methods of heating stereotype pots, electricity was selected and a complete

A 2,500-lb., 15-kw. flat stereotype melting pot.

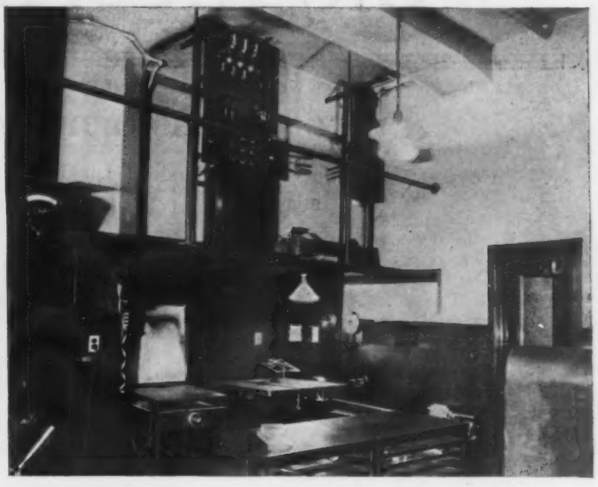


A 5-ton, 45-kw. linotype pig melting pot.

installation of three Hoe melting pots was purchased. These include a 5-ton, 60-kw. stereotype pot, a 5-ton, 45-kw. linotype pig melting pot, and a 2,500-lb., 15 kw. flat stereotype melting pot, together with automatic



Electric mat roasters used for drying matrices.



Control equipment for 60-kw. and 15-kw. stereotype pots.

control equipment. The installation also included two electrically heated mat roasters rated at 19 amp., 220 volts, for drying matrices preliminary to making stereotype castings.

Before the installation was made an estimate of the cost of operating the 60-kw. pot was derived from data gathered from various sources. These estimates were based upon an output of 446,000 lb. of stereotype plates per month. It was estimated that 13,000 kw.-hr. at 60 kw. demand would be required to obtain this output.

Records kept since the installation was made show the actual production to have averaged 500,000 lb. of plates per month with an average monthly consumption of 14,000 kw.-hr., or an average of 28 kw.-hr. per 1,000 lb. of metal melted. In a single test run over a four-day period an average consumption of 21.8 kw.-hr. per 1,000 lb. of metal melted was obtained.

Twelve 5-kw. General Electric helicoil cast-in immersion units are used to provide heat for the 60-kw. pot. These are mounted around the rim of the pot extending to a depth of 18½ in. into the pot. Close control of temperature is provided automatically by means of a General Electric automatic control panel. The panel contains a main line contactor, operating relay, overload relay and heat control switch. Since three-phase service is used there is a Y-delta switch in the heater circuit permitting a reduction of the energy input to one-third normal when no casting is being done. Temperature control is provided by means of a sensitive bulb inserted in a heat-well in the metal. There is also a temperature limit fuse to prevent the temperature of the molten metal from exceeding 800 deg. F.

The normal cycle of operation of the pot is as follows: About 9:30 a.m. the pot is turned on high heat and the temperature control set for 630-650 deg. F. Within half an hour the metal is up to temperature and casting begins. The casting continues until 4:15 p.m. for the afternoon paper, when the controls are set for low heat and a temperature of 550 deg. F. It was found to be more economical to keep the metal at this temperature during the period when no casting was being done than to let it solidify and then remelt it.

No accurate records have been kept on the 5-ton, 45-kw. linotype pig melting pot. However, approximately 125,000 lb. of metal per month is melted with an average monthly consumption of 4,800 kw.-hr. This unit is equipped with nine 5-kw. General Electric helicoil cast-in immersion units installed in the same manner as on the stereotype pot.

The normal cycle of operation of this machine is as follows: At 11:30 a.m. the controls are turned on low heat and the temperature control set for 650 deg. F. The pot is loaded as metal accumulates from the linotype machines. About 8 p.m. the metal is usually melted and in two hours the pigs are poured. Frequently it is necessary to boost the control to high heat when there is an extra amount of metal to be melted.

Complete data on the operation of the 2,500-lb., 15-kw. flat stereotype melting pot are not available. However, it is estimated that 50,000 lb. of metal per month are melted with an average monthly consumption of 3,000 kw.-hr. This pot is used for making flat stereotype plates and for stripping nickel plates. It operates continuously at 650 deg. F. Three 5-kw. immersion units of the type employed in the other pots are used for heating. As in the case of the other pots, control is entirely automatic.

The electric mat roasters were built on special order by the Arthur-Fowler Company of Spokane and replace gas heated units formerly used. As in the case of the other electrically heated equipment they are designed for three-phase operation at 208 volts.

Experience with the equipment to date indicates some decided advantages over similar equipment heated with fuels. These include close automatic control of the temperature of the stereotype metal at all times, with a consequent reduction of labor and attendance. Electric heat has permitted a maximum rate of heating without overheating. Castings produced have been of a uniform quality and there has been a reduction in the number of rejects. Maintenance expense has been reduced owing to the even distribution of the heat over the equipment and the elimination of flames in direct contact with the pot. Metal losses have been reduced. The metal melting room has been transformed from a hot, dirty, and poorly ventilated place into one of the most comfortable workshops in the newspaper plant. In addition there has been a reduction in fire hazard. The equipment is popular with the workman and as a result production has increased.

Engineering Practice

Power Transformers Salvaged and Rebuilt

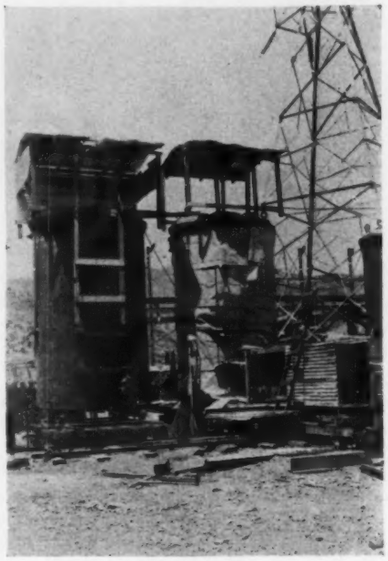
Seven 5,833-Kva. Units Washed 1,000 Ft. Downstream Located With Magnetic Needle, Uncovered With Power Shovels and Rebuilt in Field

By A. C. WINGO and C. M. ALLEN*.

APPARENT loss of seven 5,833-kva. 66/110-kv. transformers proved to be a major problem in the reconditioning of the San Francisquito No. 2 hydro-electric generating plant of the Bureau of Power and Light of the City of Los Angeles. This plant was destroyed by flood on the morning of March 13, 1928. (Electrical West, April 1, 1928.) Initial examination of the ruins showed that the No. 1 generating unit had suffered no mechanical damage, since it was not running at the time the flood occurred, and thus could be reconditioned for service within a comparatively short time. This fact, of course, forcused attention upon the missing transformers since their salvage and possible replacement into service would permit the Bureau to enjoy the power output of the No. 1 unit many months before new transformers could be purchased and delivered to the job.

Loss of the generating plant was a severe blow to the power resources of the system and the reduced generating output had to be made up by purchased power, the cost of which amounted to a large sum for each day the plant was out of service. This fact stimulated a desire to find and repair the missing transformers almost regardless of the cost involved because whatever the cost might be, it would be much less than the loss arising from having the No. 1 unit remain idle until new transformers could be secured. Through concerted efforts three of the transformers were salvaged, repaired and ready for service by the time the No. 1 unit was cleaned and dried out (Electrical West, Jan. 1, 1929) and the combination was placed in service June 14, 1928, just 93 days after the disaster.

In spite of the fact that the 5,883-kva. transformers weighed 31.5 tons each, including the oil, they were found to have been scattered along the canyon from 500 to 1,000 ft. downstream from the site of the plant. The first three of the units were discovered readily since they were partially exposed. The fourth transformer was located with little difficulty because of oil seepage which came through to the surface. The last three of the units, however, were well secreted indeed and were found to be buried under from 5 to 20 ft. of muck. Finding of these last three units taxed the ingenuity of the engineers searching for them and every idea possible was used to effect their discovery.



Under dry-out using electric heat and a hot-air blower.

A complete survey of the canyon was made using a magnetic dip needle which, of course, gave a true indication of buried metal including structural members, high-tension oil circuit breaker tanks and other miscellaneous small equipment, in addition to the three missing transformers. The read-

General view of the site of the San Francisquito No. 2 plant of the Los Angeles Bureau of Power and Light taken immediately following the destruction of the plant and showing the positions of the seven transformers "before and after." View at the right shows the seventh unit after it was partially excavated from beneath 18 ft. of debris.

* Junior electrical engineers, Generation and Construction Division, Bureau of Power and Light, City of Los Angeles.

ings obtained were tabulated carefully and with them the probable location of the missing transformers was determ-

Recovering the sixth unit.

ined, taking into consideration a first-hand knowledge of the original contour of the canyon as well as the known location of the first four transformers recovered. With the probable position determined, gas engine driven shovels and clam-shell buckets were set to work with the result that all of the missing transformers were accounted for after many hundreds of yards of debris had been moved.

Repair work on the first three transformers recovered was started with all possible haste in order to have them ready for temporary service simultaneously with the No. 1 generating unit, which also was undergoing a hurried reconditioning. As soon as the transformers were located complete new sets of windings, Herkolite cylinders, conservators, high- and low-tension bushings and other necessary accessories for three complete transformers were purchased.

It was evident that the rugged construction of the transformer tanks and the internal bracing was all that saved them from complete destruction. The Z-bar braces on the outside of the tanks were torn and twisted so badly that nearly all of them had to be replaced by new members. The ⅜-in. boiler-plate tanks were badly battered and punctured, necessitating heroic measures with heating torches, hydraulic jacks and vigorous hammering to restore them to serviceable condition. The cast-iron tank covers and flanged rings on the first three transformers, together with the trucks and all valves and fittings, were replaced with new parts. The water cooling coils were the only parts that were practically undamaged.

A repair shop was set up on the job and fitted up with a tower designed to accommodate the handling of the 16-ton cores, together with such other emergency equipment as was necessary for the rehabilitation job. A drying oven was constructed adjoining the shop, 8 x 10 ft. in floor size and 9 ft. high, built with a concrete floor, hollow tile walls and reinforced concrete roof. Heat for this oven was supplied by two 20-kw. hot-air blowers and circulation was controlled by twelve 2-in. pipe vent regulators projecting through the walls directly under the roof slab.

Some difficulty was experienced in extracting the cores from the tanks as some of the tanks had been badly dented and in some instances were full of sand, gravel and other debris. The cleaning process was begun with an

Typical transformer core assembly after removal from tank.

ordinary fire hose, washing out the mud, sand and gravel with a high-pressure stream of water. Following the washing process, air under high pressure was used to drive off surface moisture prior to the complete dismantling.

After the first three transformers had been torn down it was apparent that the coils and Herkolite cylinders were not damaged as badly as had been anticipated. In fact in some instances they were practically undamaged. The original coils then were given a thorough cleaning and overhauling and the laminated cores, once stripped of their windings and accessories, were thoroughly cleaned and straightened.

Close inspection of the coils revealed that when they originally were impregnated with varnish and baked, numerous bubbles of various sizes had formed on the surfaces. In every instance these bubbles were found to contain water. To assure complete dryout the disassembled coils and laminated cores were placed in the oven and baked for three days at a temperature of 90 deg. C. Subsequent to this initial baking process the cores and coils were reassembled and given another three-day baking at 90 deg. C. Then immediately upon completion of preliminary tests the tanks were placed about their respective windings and filled with oil.

At this stage of the rebuilding the No. 1 generating unit, together with a temporary outdoor switching station and control house, was complete and ready for operation. Therefore the salvaged transformers were installed in the switching station and connected on short-circuit as a unit with the generator for a final dryout which was accomplished in 144 hours.

As before stated, this equipment was placed in service June 14, 1928, just three months and one day after its destruction and its record of operating performance to date is perfect.

Rebuilding of the last four remaining transformers was accomplished in the same manner, except that the final dryout was done with hot-air blowers. As previously stated, coils and accessories for the rewinding of three transformers were purchased immediately following the disaster. With the exception of high- and low-tension bushings, conservators, valves and fittings, the only parts used in the complete rebuilding of the seven transformers were three sets of windings. The rest of the windings were salvaged and reconditioned including one extra set which is being kept on hand as spare equipment.

Two of the transformers that were located first.

Lightning Wave Characteristics Revealed by Cathode-Ray Oscillograph

MANY of the mysteries of lightning and its immediate effect upon transmission systems heretofore shrouded in the previously immeasurable combination of millions of volts and millionths of a second are being brought to light by the cathode-ray oscillograph. This new device is a newcomer in the field of precise measuring instruments and the most sensitive of them all. With it it is possible to obtain definite translatable photographic records of electric and other disturbances even though that disturbance may last only one-millionth of a second or less.

Since the fallacy of the belief that 220-kv. lines are immune to lightning disturbances has been established, the importance of lightning research to the successful operation of transmission systems has given added impetus to such investigations. According to the General Electric Company, engineers of that company and of several Eastern power companies have been co-operating for more than three years in an endeavor to ascertain the characteristics of lightning and its actual effects on a 220-kv. transmission system. These investigations have been carried on in the Allegheny Mountains near Lake Wallenpaupack, Pa., on the Pennsylvania Power and Light Company's 220-kv. transmission lines. According to the report this is the first 220-kv. line ever built in a definitely known lightning-infested territory and the first line of that voltage to be built outside of the State of California.

In Fig. 1 is shown the reproduction of a cathode-ray oscillogram taken at noon, July 27, 1928, and revealing the characteristics of a 2,500,000-volt lightning stroke on a 220-kv. line. This record was made automatically by the portable oscillograph shown in Fig. 2.

Less than a week after the cathode-ray high-speed camera had been installed and placed in working order the awaited thunderstorm arrived and the picture here reproduced was taken automatically. The negative showed that before five-millionths of a second had passed the voltage wave had climbed to a value of more than 1,500,000 volts. A local disturbance due to an induction flashover and attendant reflection then caused a rise to 2,500,000 volts in a fraction of one-millionth of a second. This splash or ripple then died down in one-millionth of a second and the wave passed to a value below the danger point in about ten-millionths of a second and then died down to zero with a total elapsed time for the entire disturbance of only forty-millionths of one second (0.00004 sec.).

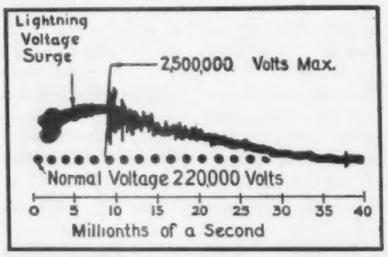


Fig. 1. Cathode-ray oscillogram showing nature of lightning stroke on a transmission line before reaching ground.

This particular picture is of especial interest since it shows characteristics closely in line with predictions made by F. W. Peek, Jr., in a paper presented before the Franklin Institute in Philadelphia in September, 1924. In that paper the predictions of Mr. Peek were based upon his years of experimenting with artificial lightning in the General Electric high-voltage laboratory at Newton, Mass.

The field laboratory from which the accompanying illustrations came was planned with the expectation of continued observation on natural lightning. It is expected that these observations will contribute a share of the great mass of data that will be required for practical solution of lightning-control problems on transmission systems.

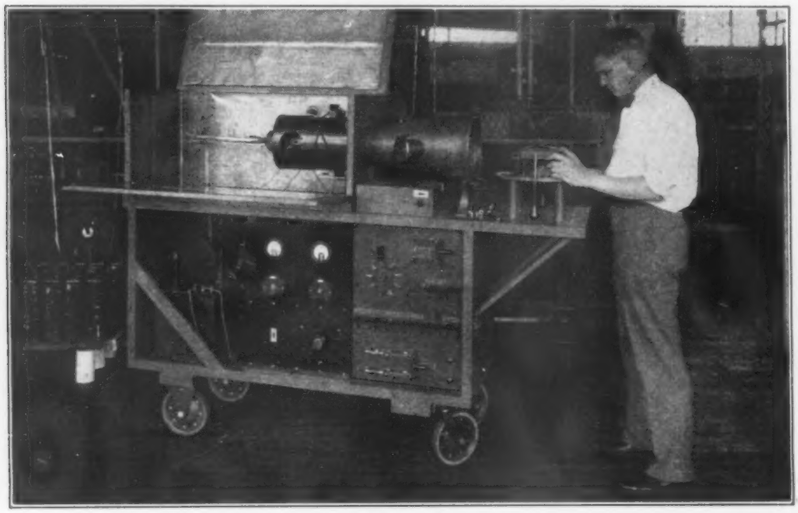
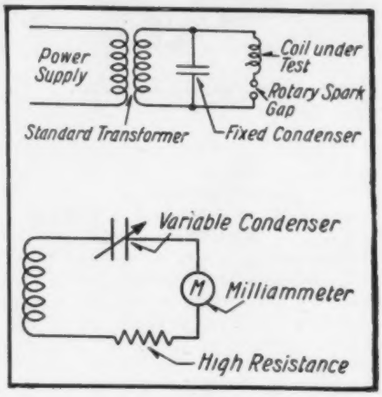


Fig. 2. Portable cathode-ray oscillograph opened to show tube and camera.

Radio-Frequency Test Detects Faulty Coil Insulation

Radio-frequency currents now are used with marked success to test the insulation of motor and generator field coils and coils used for induction regulators and other electrical equipment according to J. L. Rylander, motor engineer, Westinghouse Electric & Manufacturing Company. It is claimed that this high-frequency method of testing has reduced the number of field coil failures in service in the ratio of 20 to 1.



Oscillatory circuit (above) for testing between-turn insulation on coils and pick-up circuit (below) which indicates detuning in oscillatory circuits as caused by faulty insulation.

As shown in the accompanying illustration, the oscillatory circuit consists only of a power transformer across the secondary of which is shunted a fixed condenser of suitable capacity and with the coil under test connected in series with a rotary spark gap. With this arrangement the test voltage to be applied to any given coil may be varied at will by adjusting the spacing of the rotary spark gap.

The pick-up circuit, also shown in the accompanying illustration, consists only of a pick-up coil, a variable condenser, a sensitive milliammeter and a high resistance all connected in series. With the oscillatory circuit operating under normal conditions the pick-up circuit is tuned by means of the variable condenser until it is in resonance with the oscillating circuit, thus giving a maximum indication of the milliammeter. With such maximum indication noted, subsequent observation of the milliammeter will indicate immediately when a faulty coil is placed under test in the oscillating circuit. The effect of the insulation breakdown between turns within the coil is to detune the oscillating circuit, thus throwing it out of resonance with the receiving circuit and causing a drop in the milliammeter indication.

Clock and Pressure Gage Effect Economical Control of Steam Plant Water Pumps

AN AUTOMATIC control scheme saving approximately $400 per month in attendance charges for the fresh-water supply pumps has been in successful operation for the past four years or more at the Long Beach steam plant of the Southern California Edison Company. The peculiar local conditions fostered the development of a unique arrangement.

The pressure-gage control scheme shown in the accompanying illustration was resorted to because it was impractical to consider the use of an ordinary control circuit. The pumps in this case are located about a mile from the steam plant across a ship channel. Thus, to use an ordinary float-switch control circuit would have required either a seven or eight-control cable under the channel or an aerial control circuit on the transmission towers 185 ft. above the channel. The under-water control circuit was out of the question because of its cost and because the channel is subject to frequent dredging operations. With the overhead crossing of the control circuit the proximity to the high-tension transmission line would have caused trouble and possible damage under transmission short-circuit conditions.

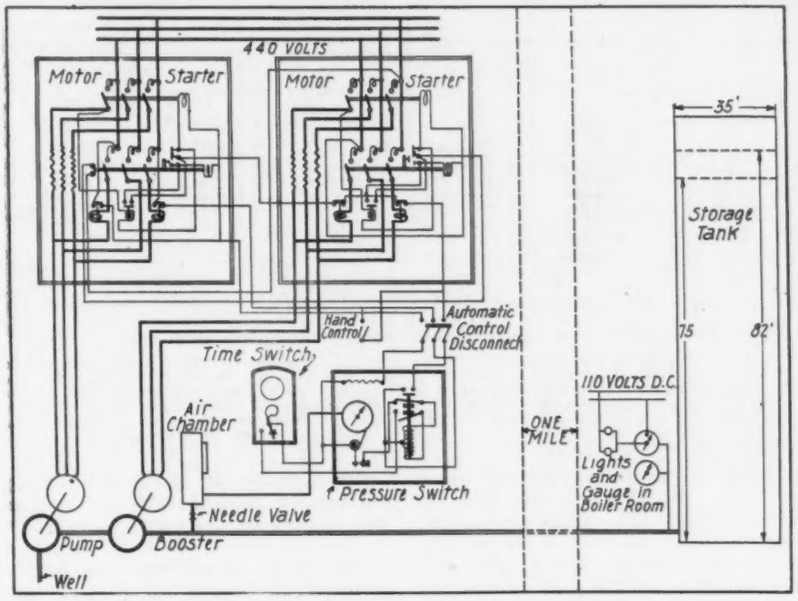


Diagram of automatic control scheme for fresh water pumps located approximately a mile from the storage tank at a large steam plant.

As shown, the present scheme utilizes a sensitive contact-making pressure gage connected through an air chamber and needle valve to the discharge line from the booster pump. The needle valve and the air chamber are required to overcome the oscillating pressure incident to the inertia of the long moving column of water. Observation shows that the period of oscillation is about 55 sec. per cycle and that 2.5 min. are required for this oscillation to come to rest. Therefore, the combination of needle valve and air chamber are so set that a sustained pressure change lasting at least 2.5 min. is required for the operation of the contact-making pressure gage which starts the pumps.

This gage is adjusted to start the pumps whenever the water in the storage tank at the plant falls to the 82-ft. level. The size of this storage tank is such that the space between the 82-ft. level and the top of the tank is sufficient to hold a 3-hr. pump run without overflowing. The pumps are shut down automatically every three hours by a self-winding clock and subsequently remain out of service until the water in the storage tank reaches the 82-ft. level at which time the contact-making pressure gage again places the pumps in service automatically.

To prevent failure of water supply without notice, a contact-making pressure gage has been connected up to the main supply line at the storage tank and adjusted to energize two bright signal lamps on the boiler room operating board whenever the water in the storage tank falls to a depth of 75 ft. An indicating depth gage also is placed on this boiler-room board, and a recording flowmeter provides a standing record of performance. Plant operating routine calls for a man to visit the pump house only once every few days to inspect equipment.

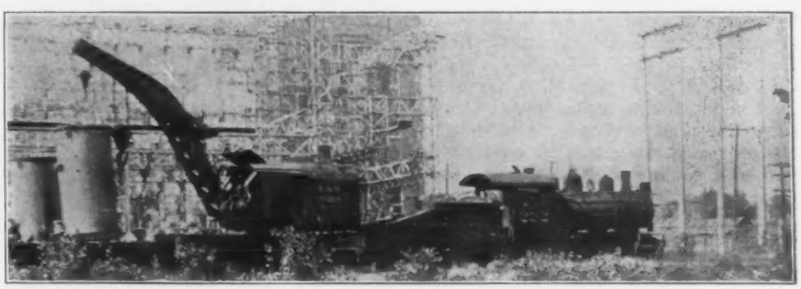
The contact-making gage utilized for pump control as described in the foregoing was selected for the control equipment after careful study of the conditions involved. A simple pressure-gage control would have failed to function because the pump delivery drops from 800 to 750 g.p.m. during each 20-minute operating period due to falling water level in the well. This caused a decrease in friction head in the pipe line which amounted to something more than the normal increase in static head in the storage tank during the same period. Schemes for building up a special compound gage which would compensate for the varying friction heads were discarded for the less delicate and more reliable combined pressure gage and clock control described.

Water Lubrication Used for Large Pump Bearings

What is said to be the largest pump ever installed with water-lubricated bearings recently was placed in service by the Etiwanda, Calif., Water Company. This pump is installed in a well 450 ft. deep and boosts the water to a point 190 ft. above the casing head, making a total lift of 640 ft. The lifting and boosting action is accomplished in one operation.

Water-lubricated bearings were adopted for thus pump because it was believed that the results would be more satisfactory than if oil were to be used as a lubricant. The design of the bearing is such that it cannot rapidly be destroyed by possible sand in the water.

One Way to Unload Heavy Transformers



The problem of unloading several 7,500-kva., 100/13.8-kv. transformers at the Terminal substation of the Public Service Company of Colorado was solved by using a Colorado & Southern Railroad wrecker for the job. Each transformer unit weighed 19.5 tons exclusive of oil.

Reverse Registry in Electric Meters—I

Meter May Record Its Own Load Correctly and Yet Run Backward Due to "Leakage" Return of Foreign Ground Current

By E. C. Goodale, Tacoma, Washington

UNLESS a power company has a fixed rule concerning the grounded service wire in installing a single-phase meter, there will be really justifiable complaints occasionally arising from this as a cause of meters running backward. The rule which should be adhered to is:

The grounded service wire should always be connected to the inner (potential coil) terminal of the two "line" terminals of the meter.

It never should be connected to the outer (current coil) terminal, for if so connected, under certain conditions, the meter will run backward under some loads and forward under others even though these loads are independent loads located anywhere else on the same secondary circuit.

The meter thus wrongly connected may register its own load perfectly as also may be true of all the other meters on the same secondary circuit. The trouble arises from the fact that if a ground develops on the load side of this wrongly installed meter and if such a ground happens to be on the wire which is grounded at the transformer, a part of the current drawn by external loads may wander back through the current coil of the meter in question causing it to give a false registration. If the "ground" service wire has a poor joint in it this most certainly will result. The higher the resistance of this grounded service wire, the more current will leak back through the meter to ground, through the ground, and back to the transformer.

A grounded service wire of ample proportions and with good splices, if any, usually will have a resistance varying from a small fraction of an ohm to a very few ohms at most. The resistance of an earth ground, however, will vary from very low values under conditions of short distance, moist earth and good contact surfaces to a maximum of as much as 1,000 ohms or more at distances of about 25 ft. Ground resistances decrease to perhaps 50 or 100 ohms at distances of about 500 ft. (See Cunliffe's experiments on "Factors Affecting Resistance of Ground Connections"—Jour. of I.E.E., 1909, Vol. 43, p. 40.)

If the ground connection from the load side of the meter back to the transformer ground is very good (of low resistance) and the grounded service wire is a poor conductor due perhaps to unsoldered joints, the condition of wrong registration will exist. It is merely a matter of two paths in parallel and of course the current will divide between them in inverse proportion to their resistance.

Fig. 1A shows a condition of wrong connection and indicates the effect on the meter of a load on the same transformer leg as is the meter. The registration is backward. Fig. 1B shows a correct connection for the same load and ground condition. The ground if on at the time of making the change would blow a fuse or at any rate would show up on the meter. If the ground were on the other load wire it would not show up on the meter and ordinarily would do no harm whatever. Fig. 2A shows the effect on the wrongly connected meter of a load on the opposite transformer leg. It causes the meter to register forward. Fig. 2B shows the effect of reversing the service leads. The effect is the same as in Fig. 1B.

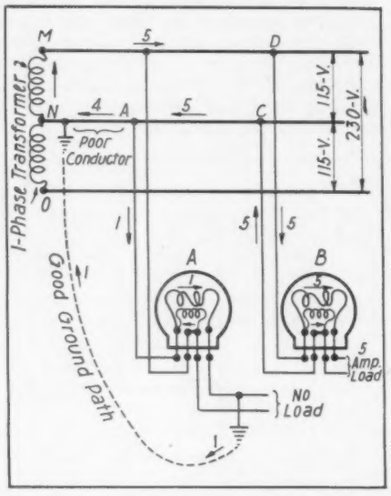


Fig. 1A. Wrong connection of line wires to meter A gives that meter a backward impulse to the extent of 115 watts from a 575-watt circuit load being fed through meter B elsewhere on the secondary circuit.

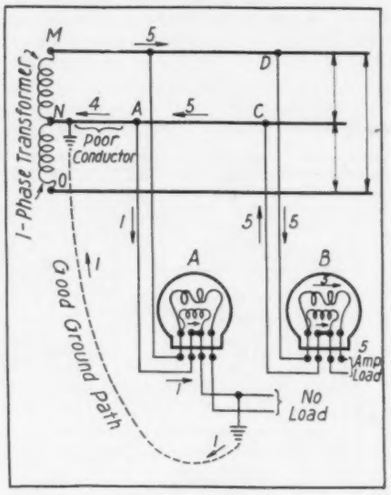


Fig 1B. Same circuit and load conditions as those shown in Fig. 1A, but with the connections to meter A reversed so that the leakage ground current returning through the grounded service wire of that meter causes no indication.

At this point it may be well to show when a single-phase meter will run forward and when it will run backward. Consider the instant of time at which the voltage is from O to M in the transformer. Since it is a single-phase transformer the current will not be more than 90 deg. out of phase with the voltage, usually very nearly in phase with it since lamps and heating appliances which comprise the greater part of the average household load draw in-phase current. Consequently the current for any load at such an instant will be traveling upward through the transformer, out to the load and back into the bottom of the transformer coil across which the load is connected.

For example, the current drawn by the loads of meters A and B will at this instant be flowing from N to M, out of M through the meter to the load and back to N. For the load of meter C it will be from O to N, out of N through the meter to the load and back to O.

For the meter to register properly, the current must pass through its current coil in the same direction and at the same time as the exciting current of the potential coil passes through it. Both current coil and potential coil currents must pass either from left to right as in meter B or from right to left as in meter C. If the current is flowing in one direction through the current coil of a meter at the same time that the exciting current is flowing in the opposite direction through the same meter's voltage coil, the meter will run backward. An example is the meter A in Fig. 1A.

The direction in which the exciting current will flow through the voltage coil is fixed by the terminal to which its line side is connected. If connected to the upper of the two transformer terminals feeding it, the exciting current will flow from left to right at this instant (line side to load side). However, if the line side of the potential coil is connected to the lower of its two transformer terminals, the exciting current will flow from right to left.

The direction in which the current will flow through the current coil normally is the same as that through the voltage coil, but under certain conditions such as those illustrated in Fig. 1 some will flow in the opposite direction and therefore register backward on meter A. The part which leaks through meter A in the reverse direction under these conditions is current from another load connected across the same transformer leg as meter A. If on the opposite leg, as in Fig. 2, this leakage will be registering forward on meter A.

In the illustrations the resistance of the grounded service wire from point N to point A is assumed to be ¼ as much as that by way of meter A through the ground on its load side and back through the earth or other ground to the transformer ground to point N.

Then, in Fig. 1A, where the load is on the same leg as meter A, the 5 amp. for meter B's load leaves M, passes to D, through meter B's current coil,

through its load, back to C and to A, splitting at A, 4 amp. going through the neutral wire and 1 amp. through meter A to ground and back to the transformer ground to N. Thus, although meter B is registering its load correctly, meter A is registering backward by a fraction of B's load equal to

$$\frac{Rg}{Rn + Rg}$$

, where Rg is the resistance of the total ground route and Rn the resistance of the grounded service wire route from point N to point A. Fig. 2A shows in a similar manner how a load C on the opposite leg may make the meter A register forward in case there is a ground on the load side of A.

It may be mentioned here that meter A may be registering its own load correctly. It is the additive or subtractive registration of the outside loads which is being discussed here.

Figs. 1B and 2B show the correct way to install the service wires and

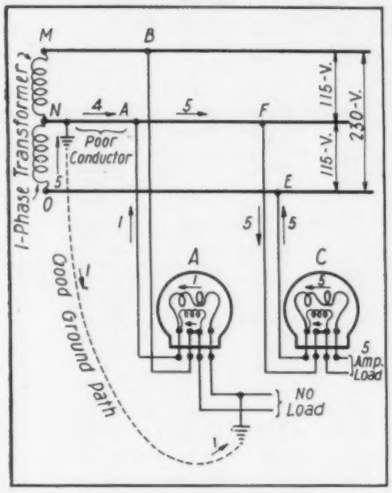


Fig. 2A. Meter conditions same as in Fig. 1A, but with 575-watt circuit load on the other side of the line. Meter A has a backward impluse of 115 watts.

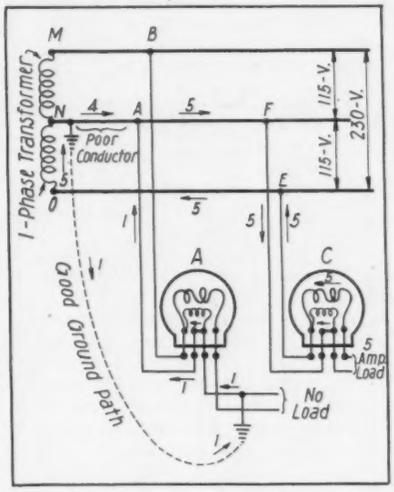


Fig. 2B. Load conditions same as in Fig. 2A, but with correct line connections to meter A obviating possibility of erroneous registration due to returning ground

the effect on meter A. The immediate effect of reversing the service wires would be to blow a fuse due to the direct ground of the "hot" wire, unless the ground were of a high resistance in which case it would manifest itself by running the meter forward, but might not be drawing current enough to blow the fuse. To eliminate the bad effects of such a ground, the two load wires from the meter also should be interchanged. Then the "hot" wire no longer would be grounded and the leakage current although still passing back through meter A's loop would pass through the "bar" of the meter instead of the coil and hence there would be no registration of external loads.

Of course, due to the usual good conductivity of the grounded service wire the amount of current which would register incorrectly on such a meter, even if it had a ground (usually of fairly high resistance as compared with the grounded service wire), would be inappreciable. However, the exceptional case usually is not so obvious that it can be determined at a glance. Therefore a great many power companies do make a standard practice of checking for the grounded service wire, placing it in the "potential" (inner) terminal on the line side of the meter even in rural installations where the Code is not so strictly enforced. Where there is strict enforcement of the Code this automatically takes care of itself since both service and load wires are grounded in the switch boxes.

One case strongly illustrating the ill effects of improper service connections was that of a three-wire service on which there were two meters, one for the range and one for lighting. The range meter worked correctly under all conditions, but the lighting meter would run backward when any one of the three range plates was turned on and forward when the other plates or the oven units were used.

Interchanging the two service wires into the lighting meter immediately isolated the grounded circuit by blowing its fuse. Interchanging the load wires on this circuit cleared it.

EDITOR'S NOTE: Another case of meter reversal, its ill effects and how to correct it will be discussed by the author in a subsequent issue of ELECTRICAL WEST.

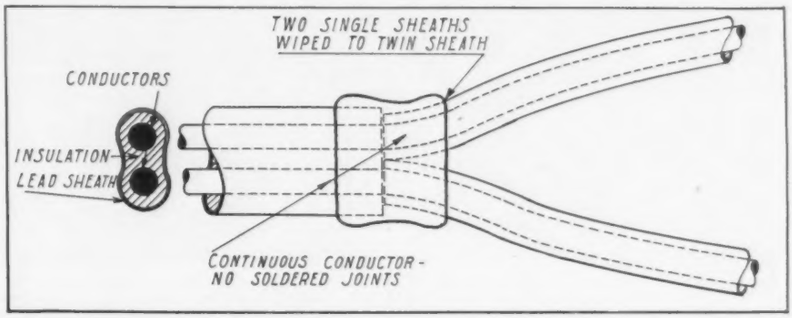
Cable Scheme Eliminates Soldered Joints

To obviate the use of soldered joints in connecting bus tie cables between adjacent manholes, the underground engineers of the Puget Sound Power & Light Company, Seattle, have devised the scheme indicated in the accompanying sketch. With the old method it was customary to pull the 2-conductor cable into the manhole to a point somewhere near the junction box and there to terminate the 2-conductor cable, completing the connections through the two widely separated entrances into the junction box by means of two single-conductor cables. This of course necessitated a soldered connection where the single-conductor cables were joined to respective conductors in the twin cable. Soldered connections for heavy loads are not eminently satisfactory.

With the new method of construction the 2-conductor cable is pulled into the manhole, clear through to the junction box, to allow a proper length to work with. Then the lead sheath is cut and stripped back to the point at which the soldered connection between the single and the twin conductor cable formerly was placed. Thus the twin conductor cable is separated into two single conductor cables from that point to the junction box. Separate lead sheaths then are pulled on over each of the single conductors completing the effect of single conductor cables back to the junction point from the junction box, but entirely doing away with the old type soldered connections. Where the single conductor lead sheath and the sheath of the twin conductor cable come together a wiped joint is prepared and the job is completed.

Perhaps contrary to first impressions it is a fact that the new method actually costs less than the old method. Specifically, there are four distinct advantages to this method of splitting the twin conductor cable into two single conductor cables for entry into the junction box:

1. Lower labor cost;
2. No connectors required;
3. No joint resistance;
4. Better looking and much stronger connections.



Stripping the sheath from twin-conductor cable and replacing it with two single sheaths eliminates soldered joints in conductor. See text.

Reference Tables for Use in Routine Tests of Distribution Transformers

A SET of ready reference tables used to a distinct advantage in the underground division of the distribution department of the Southern California Edison Company is reproduced herewith. These tables have been found to be simpler in use than curves and they replace the various pencil scratchings and hasty calculations previously resorted to when making monthly routine load tests on transformers and feeders in underground districts.

The tables are designed for use for reference purposes and give the relative amperes and kilowatts for 2.3 and 4-kv. circuits and also show the proper ratio of current transformer to use in any particular test. The formula used in the preparation of these tables allows for the average normal power factor and for average normal transformer efficiency and gives a nominal basis for computation. The basis of calculation is as follows:

On a 4-kv. star-connected four-wire system the

$$1\phi \text{ kva.} = \frac{2{,}300 \times \text{amp.}}{1{,}000} \text{ and the}$$

$$3\phi \text{ kva.} = \frac{4{,}000 \times \text{amp.} \times 1.73}{1{,}000}$$

Assuming 85 per cent power factor the

$$\text{kw.} = \text{kva.} \times 0.85$$

Of course

$$\text{hp.} = \frac{\text{kw.}}{0.746}$$

Assuming a nominal value of 88 per cent for motor efficiency

$$\text{hp.} = \frac{\text{kva.} \times 0.85 \times 0.88}{0.746} = \text{kva.}$$

Consequently in the accompanying tables the kva. and hp. are considered to be one and the same figure.

TABLE I—For 1 to 10-Kva. Transformers. Use 5/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	0.46	0.39	1.38	1.17
0.4	0.92	0.78	2.76	2.35
0.6	1.38	1.17	4.14	3.52
0.8	1.84	1.56	5.52	4.69
1.0	2.30	1.96	6.90	5.87
1.2	2.76	2.35	8.28	7.04
1.4	3.22	2.74	9.66	8.21
1.6	3.68	3.13	11.04	9.38
1.8	4.14	3.52	12.42	10.56
2.0	4.60	3.91	13.80	11.73
2.2	5.06	4.30	15.18	12.90
2.4	5.52	4.69	16.56	14.08
2.6	5.98	5.08	17.94	15.25
2.8	6.44	5.47	19.32	16.42
3.0	6.90	5.87	20.70	17.60
3.2	7.36	6.26	22.08	18.77
3.4	7.82	6.65	23.46	19.94
3.6	8.28	7.04	24.84	21.11
3.8	8.74	7.43	26.22	22.29
4.0	9.20	7.82	27.60	23.46
4.2	9.66	8.21	28.98	24.63
4.4	10.12	8.60	30.36	25.81
4.6	10.58	8.99	31.74	26.98
4.8	11.04	9.38	33.12	28.15
5.0	11.50	9.78	34.50	29.33

TABLE II—For 10- to 20-Kva. Transformers. Use 10/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	0.92	0.78	2.76	2.35
0.4	1.84	1.56	5.52	4.69
0.6	2.76	2.35	8.28	7.04
0.8	3.68	3.13	11.04	9.38
1.0	4.60	3.91	13.80	11.73
1.2	5.52	4.69	16.56	14.08
1.4	6.44	5.47	19.32	16.42
1.6	7.36	6.26	22.08	18.77
1.8	8.28	7.04	24.84	21.11
2.0	9.20	7.82	27.60	23.46
2.2	10.12	8.60	30.36	25.81
2.4	11.04	9.38	33.12	28.15
2.6	11.96	10.17	35.88	30.50
2.8	12.88	10.95	38.64	32.84
3.0	13.80	11.73	41.40	35.19
3.2	14.72	12.51	44.16	37.54
3.4	15.64	13.29	46.92	39.88
3.6	16.56	14.08	49.68	42.23
3.8	17.48	14.86	52.44	44.57
4.0	18.40	15.64	55.20	46.92
4.2	19.32	16.42	57.96	49.27
4.4	20.24	17.20	60.72	51.61
4.6	21.16	17.99	63.48	53.96
4.8	22.08	18.77	66.24	56.30
5.0	23.00	19.55	69.00	58.65

TABLE III—For 20- to 30-Kva. Transformers. Use 15/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	1.38	1.17	4.14	3.52
0.4	2.76	2.35	8.28	7.04
0.6	4.14	3.52	12.42	10.56
0.8	5.52	4.69	16.56	14.08
1.0	6.90	5.87	20.70	17.60
1.2	8.28	7.04	24.84	21.11
1.4	9.66	8.21	28.98	24.63
1.6	11.04	9.38	33.12	28.15
1.8	12.42	10.56	37.26	31.67
2.0	13.80	11.73	41.40	35.19
2.2	15.18	12.90	45.54	38.71
2.4	16.56	14.08	49.68	42.23
2.6	17.94	15.25	53.82	45.75
2.8	19.32	16.42	57.96	49.27
3.0	20.70	17.60	62.10	52.79
3.2	22.08	18.77	66.24	56.30
3.4	23.46	19.94	70.38	59.82
3.6	24.84	21.11	74.52	63.34
3.8	26.22	22.29	78.66	66.86
4.0	27.60	23.46	82.80	70.38
4.2	28.98	24.63	86.94	73.90
4.4	30.36	25.81	91.08	77.42
4.6	31.74	26.98	95.22	90.84
4.8	33.12	28.15	99.36	84.46
5.0	34.50	29.33	103.50	87.98

TABLE IV—For 30- to 40-Kva. Transformers. Use 20/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	1.84	1.56	5.52	4.69
0.4	3.68	3.13	11.04	9.38
0.6	5.52	4.69	16.56	14.08
0.8	7.36	6.26	22.08	18.77
1.0	9.20	7.82	27.60	23.46
1.2	11.04	9.38	33.12	28.15
1.4	12.88	10.95	38.64	32.84
1.6	14.72	12.51	44.16	37.54
1.8	16.56	14.08	49.68	42.23
2.0	18.40	15.64	55.20	46.92
2.2	20.24	17.20	60.72	51.61
2.4	22.08	18.77	66.24	56.30
2.6	23.92	20.33	71.76	61.00
2.8	25.76	21.90	77.28	65.69
3.0	27.60	23.46	82.80	70.38
3.2	29.44	25.02	88.32	75.07
3.4	31.28	26.59	93.84	79.76
3.6	33.12	28.15	99.36	84.46
3.8	34.96	29.72	104.88	89.15
4.0	36.80	31.28	110.40	93.84
4.2	38.64	32.84	115.92	98.53
4.4	40.48	34.41	121.44	103.22
4.6	42.32	35.97	126.96	107.92
4.8	44.16	37.54	132.48	112.61
5.0	46.00	39.10	138.00	117.30

TABLE V—For 40- to 50-Kva. Transformers Use 25/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	2.3	2.0	6.9	5.9
0.4	4.6	3.9	13.8	11.7
0.6	6.9	5.9	20.7	17.6
0.8	9.2	7.8	27.6	23.5
1.0	11.5	9.8	34.5	29.3
1.2	13.8	11.7	41.4	35.2
1.4	16.1	13.7	48.3	41.1
1.6	18.4	15.6	55.2	46.9
1.8	20.7	17.6	62.1	52.8
2.0	23.0	19.6	69.0	58.7
2.2	25.3	21.5	75.9	64.5
2.4	27.6	23.5	82.8	70 4
2.6	29.9	25.4	89.7	76.2
2.8	32.2	27.4	96.6	82.1
3.0	34.5	29.3	104.5	88.0
3.2	36.8	31.3	110.4	93.8
3.4	39.1	33.2	117.3	99 7
3.6	41.4	35.2	124.2	105.6
3.8	43.7	37.1	131 1	111.4
4.0	46.0	39.1	138.0	117 3
4.2	48.3	41.1	144.9	123.2
4.4	50.6	43.0	151.8	129.0
4.6	52.9	45.0	158.7	134.9
4.8	55.2	46.9	165.6	140.8
5.0	57.5	48.9	172.5	146.6

TABLE VI—For 50- to 100-Kva. Transformers. Use 50/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	4.6	3.9	13.8	11.7
0.4	9.2	7.8	27.6	23.5
0.6	13.8	11.7	41.4	35.2
0.8	18.4	15.6	55.2	46.9
1.0	23.0	19.6	69.0	58.7
1.2	27.6	23.5	82.8	70.4
1.4	32.2	27.4	96.6	82.1
1.6	36.8	31.3	110.4	93.8
1.8	41.4	35.2	124.2	105.6
2.0	46.0	39.1	138.0	117.3
2.2	50.6	43.0	151.8	129.0
2.4	55.2	46.9	165.6	140.8
2.6	59.8	50.8	179.4	152.5
2.8	64.4	54.7	193.2	164.2
3 0	69.0	58.7	207.0	176.0
3.2	73.6	62.6	220.8	187.7
3.4	78.2	66.5	234.6	199.4
3.6	82.8	70.4	248.4	211.1
3.8	87.4	74.3	262.2	222.9
4.0	92.0	78.2	276.0	234.6
4.2	96.6	82.1	289.8	246.3
4.4	101.2	86.0	303.6	258.1
4.6	105.8	89.9	317.4	269.8
4.8	110.4	93.8	331.2	181.5
5.0	115.0	97.8	345.0	293.3

TABLE VII—For 100- to 150-Kva. Transformers. Use 75/5 Current Transformer.

	2.3 Kv. Single Phase		4-Kv. Three Phase	
Amp.	Kva. or Hp.	Kw.	Kva. or Hp.	Kw.
0.2	6.9	5.9	20.7	17.6
0.4	13.8	11.7	41.4	35.2
0.6	20.7	17.6	62.1	52.8
0.8	27.6	23.5	82.8	70.4
1.0	34.5	29.3	103.5	88.0
1.2	41.4	35.2	124.2	105.6
1.4	48.3	41.1	144.9	123.2
1.6	55.2	46.9	165.6	140.8
1.8	62.1	52.8	186.3	158.4
2.0	69.0	58.7	207.0	176.0
2.2	75.9	64.5	227.7	193.5
2.4	82.8	70.4	248.4	211.1
2.6	89.7	76.2	269.1	228.7
2.8	96.6	82.1	289.8	246.3
3.0	103.5	88.0	310.5	263.9
3.2	110.4	93.8	331.2	281.5
3.4	117.3	99.7	351.9	299.1
3.6	124.2	105.6	372.6	316.7
3.8	131.1	111.4	393.3	334.3
4.0	138.0	117.3	414.0	351.9
4.2	144.9	123.2	434.7	369.5
4.4	151.8	129.0	455.4	387.1
4.6	158.7	134.9	476.1	404.7
4.8	165.6	140.8	496.8	422.3
5.0	172.5	146.6	517.5	439.9

TABLE VIII—For 150-to 200-Kva. Transformers.

Use 100/5 Current Transformer.

Amp.	2.3 Kv. Single Phase Kva. or Hp.	Kw.	4-Kv. Three Phase Kva. or Hp.	Kw.
0.2	9.2	7,8	27,6	23.5
0.4	18.4	15.6	55.2	46.9
0.6	27.6	23.5	82.8	70.4
0.8	36.8	31.3	110.4	93.8
1.0	46.0	39.1	138.0	117.3
1.2	55.2	46.9	165.6	140.8
1.4	64.4	54.7	193.2	164.2
1.6	73.6	62.6	220.8	187.7
1.8	82.8	70.4	248.4	211.1
2.0	92.0	78.2	276.0	234.6
2.2	101.2	86.0	303.6	258.1
2.4	110.4	93.8	331.2	281.5
2.6	119.6	101.7	358.8	305.0
2.8	128.8	109.5	386.4	328.4
3.0	138.0	117.3	414.0	351.9
3.2	147.2	125.1	441.6	375.4
3.4	156.4	132.9	469.2	398.8
3.6	165.6	140.8	496.8	422.3
3.8	174.8	148.6	524.4	445.7
4.0	184.0	156.4	552.0	469.2
4.2	193.2	164.2	579.6	492.7
4.4	202.4	172.0	607.2	516.1
4.6	211.6	179.9	634.8	539.6
4.8	220.8	187.7	662.4	563.0
5.0	230.0	195.5	690.0	586.5

TABLE IX—For 200- to 400-Kva. Transformers.

Use 200/5 Current Transformer.

Amp.	2.3 Kv. Single Phase Kva. or Hp.	Kw.	4-Kv. Three Phase Kva. or Hp.	Kw.
0.2	18.4	15.6	55.2	46.9
0.4	36.8	31.3	110.4	93.8
0.6	55.2	46.9	165.6	140.8
0.8	73.6	62.6	220.8	187.7
1.0	92.0	78.2	276.0	234.6
1.2	110.4	93.8	331.2	281.5
1.4	128.8	109.5	386.4	328.4
1.6	147.2	125.1	441.6	375.4
1.8	165.6	140.8	496.8	422.3
2.0	184.0	156.4	552.0	469.2
2.2	202.4	172.0	607.2	516.1
2.4	220.8	187.7	662.4	563.0
2.6	239.2	203.3	717.6	610.0
2.8	257.6	219.0	772.8	656.9
3.0	276.0	234.6	828.0	703.8
3.2	294.4	250.2	883.2	750.7
3.4	312.8	265.9	938.4	797.6
3.6	331.2	281.5	993.6	844.6
3.8	349.6	297.2	1,048.8	891.5
4.0	368.0	312.8	1,104.0	938.4
4.2	386.4	328.4	1,159.2	985.3
4.4	404.8	344.1	1,214.4	1,032.2
4.6	423.2	359.7	1,269.6	1,079.2
4.8	441.6	375.4	1,324.8	1,126.1
5.0	460.0	391.0	1,380.0	1,173.0

Double Duty Safetv Gate for Switches Proves Effective

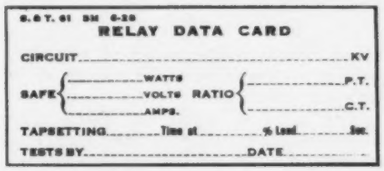
The safety barrier shown in the accompanying illustration is at once a simple, effective and inexpensive means of providing protection against erroneous operation of disconnecting switches, and a means of positive circuit identification.

These barriers are fitted with a hinging pivot at one end and a hook support at the other. The barrier is mounted on the insulating barriers which separate adjacent circuits. In the position shown in the illustration it is necessary for the barrier to be lifted at its left-hand end by means of a switch stick and dropped in a vertical plane, hinging on the pivot at the right-hand end of the barrier. After the barrier thus is removed, the operation of the disconnect switches may proceed in the usual manner to be followed by the replacement of the barrier. The illustrations show the installation in the Jefferson substation of the Portland Electric Power Company in Portland, Ore. The equipment was designed by engineers of that company.

As indicated in the illustration this safety barrier serves two purposes at once. It carries the identification of the circuit involved and of the particular disconnecting switch itself, as well as providing a physical barrier which must be removed by means of a switching stick before the operation of the disconnect switches themselves may proceed.

Relays Carry Card Giving Latest Data on Settings

All important data regarding the operating settings on induction type protective relays are made instantly available to each station operator by the relay data card system recently adopted by the Southern California Edison Company. This relay data card, a



Full-size facsimile of data card which is mounted under the glass cover on each relay.

full-size facsimile of which is reproduced herewith, gives the station operator the data he needs to determine just what maximum operating conditions he may impose upon any given circuit without causing unnecessary and unwarranted outage due to relay operation caused by circuit overloading during switching operations.

The data card is filled out by the duly authorized representative of the test department each time a test or a change in relay settings is made. It is mounted in clips or under the nameplate mounting screws under the glass covers and the covers are sealed in place. This assures that the information on the card is correct according to the latest official authorized tests.

This card system provides the one and only record of relay settings kept at any station, thus avoiding conflicts and misunderstandings which occured frequently when log-book or other written records were depended upon to inform the station operating crew of relay settings and changes.

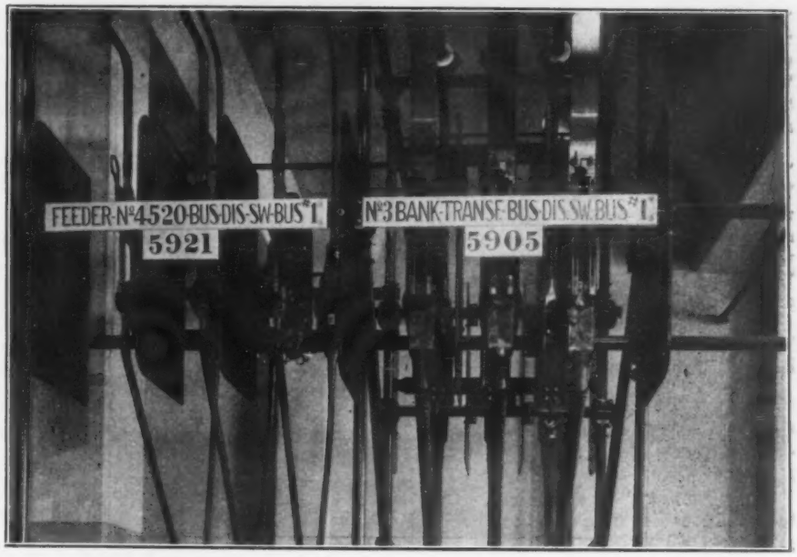
Improved Basket Type Grip Simplifies Cable Pulling

By R. E. Cunningham, Farnam & Cunningham, Los Angeles

Cable grips of the basket type have been in use for some twenty years, but certain operating annoyances have arisen, due to the fraying of the strands at the end of the grip and due to breakage caused by shoulder wear. In the new Kellems grip shown in the accompanying illustration, the weave is reversed so as to terminate all of the wires in a solid steel eye, and reinforcing tubes protect the shoulder.

The endless construction of the weave obviates twisted and soldered ends and results in a grip which needs not be taped as it will hold to the very end. The reinforcing tubes at the pulling end of the sleeve not only protect the strands of the sleeve but reduce duct friction, making the pulling job easier.

Recent tests in an Olsen testing machine showed an ultimate strength of 18,000 lb. with a 2½ and 3-in. grip.



A safety gate or barrier which must be unhooked before disconnecting switches may be operated. These barriers carry the name of the line and the number designation of the particular switch. Each line has three consecutive switch numbers, in this case 5,905 for the bus disconnecting switch, 5,906 for the oil switch, and 5,907 for the line connecting switch.

Ideas for the Contractor

"It's a gift."

STOP *This Building* "Racket"

By LAURENCE R. CHILCOTE
ATTORNEY

Told in the George Ade Style Which Made Him Famous as Manager of the Oakland Electrical Contractors Association

"WILD CAT," "Speculative," and "Shoe-string" financing has played havoc with the building business. The electrical industry, as such, should have a selfish interest, if no other, in helping to stabilize conditions. YOU can help, but before we consider the remedy, let us examine the patient. The following typical story will illustrate the urgent need for immediate treatment.

The Practice

The "promoter" finds a lot suitable for a building, say an apartment house, and makes a "dicker" with the owner to buy the lot, for little or no cash and a note for the balance, secured by a "SECOND DEED OF TRUST" on the lot and wonderful structure to be erected thereon.

The "promoter" then goes to the "Finance Company," with whom he has VERY friendly relations, if no closer connection, and prevails upon it to loan enough money to put up the building and take in return a note secured by a "FIRST DEED OF TRUST" on the property.

The stage is then all set to pick the SUB-CONTRACTORS and MATERIALMEN clean.

When the "Finance Company" is satisfied that it will have a completed building for its security, then it doesn't care WHERE the CONSTRUCTION MONEY goes.

The "promoter" gets his cut. Only those sub-contractors who refuse to complete their work until they get some money get just enough to keep them quiet; the balance of the sub-contractors, who are willing to wait for their money until the building is completed, get NOTHING.

The "Finance Company" gets its, too, usually not in so much cash, but in added security. It encourages the "promoter" to EQUIP the apartment house with stoves, carpets, linoleum, furniture, etc., allowing the "promoter" to pay for the same out of the CONSTRUCTION LOAN, taking in return a chattel mortgage on this equipment as additional security for its supposed CONSTRUCTION loan. The "Finance Company" then, for its "construction loan," has not only a completed apartment house BUILDING, but a building fully equipped, ready to operate and earn income.

"Fat Chance" on Lien

You can anticipate the last chapter: the loan depleted; no money for the sub-contractors or materialmen; nothing left except the right to file a MECHANIC'S LIEN.

These mechanic's liens, always in the tens of thousands of dollars and usually totaling to as much as half of the construction loan, are really a THIRD lien on the property. That is, they are subsequent to the "First" and "Second" deeds of trust, and as such are practically valueless, for it is rarely possible to refinance the property and get a NEW "first" which is as large as the one already on the property, and it is never possible to boost the loan enough to take care of the liens. This is the END for the Sub-contractors and Materialmen.

The "promoter" with nothing invested, continues to operate the apartment house as long as he keeps the interest paid on the "first" and "second" deeds of trust, and pockets the net revenue of hundreds of dollars per month. Sweet for the "promoter"; bitter for the lien claimants with thousands invested and no hope of return.

The Cure

The California State Legislature, now in session, has before it nine bills, each intended to correct a certain phase of the problem. To point out some of the bills in particular:

ASSEMBLY BILL NO. 790 empowers the court to appoint a RECEIVER, in a suit to foreclose a mechanic's lien, to take charge of the property and conserve the income for the lien claimants. This will stimulate the legitimate owner, against whom liens have been filed, to raise the money to take care of the liens, and terminate the receivership; and, at the same time, will deprive the "promoter" of the income and benefits to which the LIEN CLAIMANTS are justly entitled. This will transform a naked lien right of little value into something of REAL value.

ASSEMBLY BILL NO 785 extends the benefits of stop-notices or WITHHOLD NOTICES so that any sub-contractor or materialman can serve a notice on the one ADVANCING THE MONEY for the construction and when served it will be the duty of said lender to WITHHOLD sufficient money from the funds in his hands to satisfy the claim set out in the notice. This will prevent the "Finance Company" from buying furniture, etc., or allowing the money, which rightfully BELONGS TO THE SUB-CONTRACTORS, to be squandered. Then, every sub-contractor and materialman who files this notice before he starts work or begins to furnish material will KNOW whether or not there is going to be sufficient money to take care of his claim. That will be a big step in the right direction.

ASSEMBLY BILL NO. 154 is intended to make it possible to "smoke out" the owner, at the time he starts construction, as to the financial set-up on the job. The owner must file a statement showing the cost of the building, the amounts and names of the holders of all incumbrances on the property, a statement of the amount of money already advanced to the owner, and the general conditions under which the balance is to be advanced. Then, when the sub-contractor finds that the owner, where he is invited to make a DONATION in cash and material, has filed a statement which shows that the job is to cost $50,000; that the "Skinum Loan Company" is going to advance $20,000 towards the construction; that the former owner of the land still has $10,000 coming to him on the purchase price; then the sub-contractor should know at the START that he is elected to "GIVE THE PARTY."

While this may not, or probably will not, stop the Electrical Contractor from going right ahead with the job still it should discourage the materialman from pouring his material into the job.

Demand Action

The other six bills are all good and merit your support, but the three mentioned in particular, IF PASSED, will mean much to the building industry.

The Legislature has before it about 2,000 bills in all, many more than can be considered at this session. ONLY those bills WILL BE PASSED which are being strongly urged from influential quarters. Do you want these bills to pass?

You have an Assemblyman or Senator representing your district at Sacramento. Let him know that you want these bills passed—right now.

Frank McGinley, Assemblyman for the 71st District, representing Wilmington, is vice-president of the California Electragists, and chairman of the Southern Division. He is supporting legislation which will help to stop this type of building practice. See that he gets your support and that of your Assemblyman, too.

IT ALL DEPENDS ON YOU.

Simple Way to Calculate

Wire Sizes for Unbalanced Loads

Using Either Ordinary Arithmetic or Algebra— Take Your Choice

By H. L. GERBER, Department of Electricity, San Francisco.

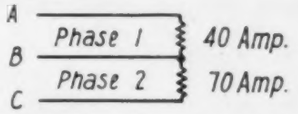
A SIMPLE method of figuring wire sizes necessary to handle unbalanced polyphase motor or other loads, which does not require the use of any form of advanced mathematics, may be worked out in the manner following. The results possible from such calculations are close enough for all practical purposes in the estimating or installing of work.

Voltage drop and power factor are not taken into consideration in these examples. Ordinary methods of calculating for them may be employed afterwards, however.

These calculating methods make use only of multiplication, subtraction and simple cancellation.

For Two-Phase Feeders

Assume an unbalanced condition on a two-phase feeder.



Between wires A and B there is a single-phase load of 40 amp. Between wires B and C there is a single-phase load of 70 amp.

The load on wire A is 40 amp., which is the load of phase 1.

The load on wire C is 70 amp., which is the load of phase 2.

To figure the load on wire B, proceed as follows:

First the entire two-phase circuit should be visualized. The total balanced load is the load of the lighter loaded phase, or 40 amp. Then the current in the common wire B is the product of the balanced load times 1.414, or 40 amps. × 1.414 = 56.56 amp. Now the unbalanced load is the difference between the balanced load of 40 amp. and the unbalanced load of 70 amp., or 70 amp. — 40 amp. = 30 amp.

This brings the following result:

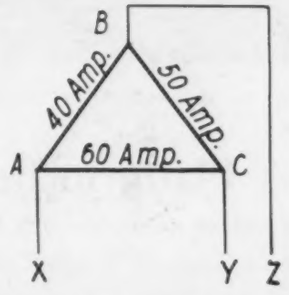
	Phase 1	Phase 2	
	Wire A	Wire B	Wire C
Balanced load.....	40	56.56	40
To phase 2 or between B and C add the unbalanced 30-amp. load.....		30.00	30
Load on each wire .....40 amp.		86.56 amp.	70 amp.
Referring to wire tables, this calls for..No. 6 wire		No. 2 wire	No.4 wire

On Three-Phase Feeders

Assume an unbalanced condition on a three-phase feeder as shown in the next diagram.

Again it becomes necessary to try to visualize thoroughly the scheme of the three-phase circuit.

The total balanced load is the load of the lightest load phase, phase AB,

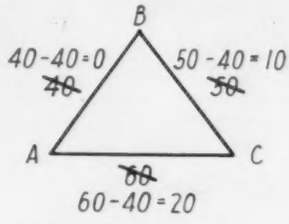


which is 40 amp. The current in wires X, Y, and Z, formed by the balanced load of 40 amp., is 40 amp. × 1.73 = 69.2 amp.

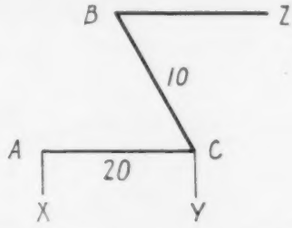
List the load then as follows:

Balanced load 40 × 1.73 = 69.2 amp. on each of wires X, Y, and Z.

Next subtract the balanced load from each phase load, as follows:



That leaves the following:

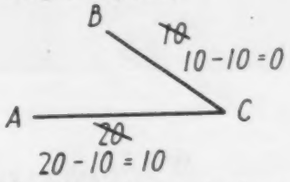


The balanced section of the remaining unbalanced load is the load of the lighter of the two remaining loads, namely B, C, or 10 amp. The load on wire Z is 10 amp. therefore, as phase BC is in series with wire Z. The load on wire X is 10 amp., as phase AC is in series with wire X. Then the load on wire Y is 10 amp. × 1.73 = 17.3 amp.

The following results are obtained:

Load on Wires	X	Y	Z
40 amp. × 1.73.....69.2	69.2	69.2	69.2
Wire Z.....			10.0
Wire X.....10.0			
Wire Y.....		17.3	
Total.....79.2	79.2	86.5	79.2 amp.

Subtracting the balanced phase from the remaining unbalanced two-phase of the three-phase system,



there is a remaining single-phase load of 10 amp. This 10 amp. then is added to its respective phase wires X and Y and the following result is obtained:

Load on Wires	X	Y	Z
Balanced 3-phase load of 40 amp. × 1.73 .....69.2	69.2	69.2	69.2
Wire Z.....			10.0
Wire X.....10.0			
Wire Y.....		17.3	
Last 10 amp to wires X and Y....10.0	10.0	10.0	
Total load on wire 89.2	89.2	96.5	79.2 amp.
Which calls for.....No. 2		No. 1	No. 3 wire

Such is the method using simple arithmetic and breaking the load down a piece at a time. For comparison, however, and because some may prefer to use the algebraic method, it is given as follows:

Solving by Algebraic Formula

To calculate by means of algebraic formulas it will be necessary to refer again to the diagram depicting the load on three-phase feeders, the second drawing in connection with this article. This provides a mental picture of the condition. The same symbols will apply; in other words, the object is to solve for load (in amps.) on wires X, Y, and Z where AB represents the load on one phase, BC the load on another, and AC the load on the third phase. Then load on

$$\text{Wire X} = \sqrt{\left(\frac{AC}{2} + \frac{AB}{-}\right)^2 + (AC \times 0.866)^2}$$

$$\text{Wire Y} = \sqrt{\left(\frac{BC}{2} + \frac{AC}{-}\right)^2 + (BC \times 0.866)^2}$$

$$\text{Wire Z} = \sqrt{\left(\frac{AB}{2} - \frac{BC}{-}\right)^2 = (AB \times 0.866)^2}$$

Either method is simple and can be worked quickly on paper, or accurately for all practical purposes with a slide rule. Those who have made use of these methods have found them satisfactory in all respects.

Two Red Seal castles overlook Lake Elsinore, the upper that of Mr. Schultz, that in the foreground the Corlin home.

"*Elsinore*-- A Platform Before the Castle"

Brightly Lighted, Electrical Throughout, This Modern Mansion Is in Sharp Contrast to Hamlet's Castle of Tragic Tradition

ON A HILL overlooking Lake Elsinore rise two mansions whose modern electrical equipment makes them worthy to carry on a new tradition. It should be a tradition of happiness and comfort whereas that of the old world Elsinore of "Hamlet" was one of tragedy.

Lake Elsinore is in Riverside County, Calif., on the road connecting Riverside with San Diego. It is served by the Southern Sierras Power Company. From W. F. Fleming of that company photographs of these two homes and details of the electrical installation have come.

The upper home is that of Henry Schultz. It is a Red Seal mansion and has many electrical features.

Just below it is the home of A. Corlin, wealthy capitalist of Los Angeles who makes his home at Lake Elsinore. The Corlin home may be said to be an electrical paradise.

Mr. Corlin is an enthusiast about electrical appliances and equipment and with the aid of Jack Calkins, electrical contractor of Elsinore, has installed practically everything electrical for the home which can be procured. According to Mr. Calkins, the job was laid out as it went along, Mr. Corlin hearing of some new appliance or idea and wanting it incorporated even as the building was under construction; some after it was built.

The home is one of ten rooms with a large garage on a lower floor, the roof of which forms a veranda overlooking Lake Elsinore. Two ornamental two-lamp street lights mark the entrance to the property. Ornamental lighting standards are numerous about the porches and grounds. A patio in the rear has two of these standards and an electrically illuminated fountain. Besides the incidental lighting, outlets are placed along the porch at convenient locations for other lighting or appliances as desired.

In the patio is an electrically operated and lighted fountain.

The garage entrance is on the lowest level. Upon reaching it, telephone connection is provided to the house upstairs. Here a servant operates the button which opens the doors allowing entrance to the house, for no knobs are provided on the doors.

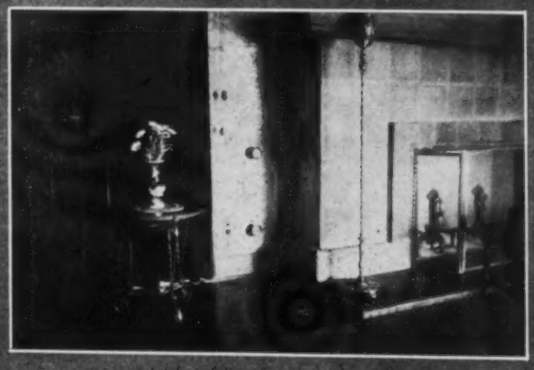
A particular feature of the house is the cove lighting in both the dining room and the large living room. There are 108 outlets in the lighting of the dining room by means of coves, besides brackets and chandeliers to be used as auxiliary lighting for various effects.

In the living room 142 outlets are provided in the coves. There are three banks of colored lights, namely red, blue and green, besides white, thus making possible all color combinations in the cove lighting.

This lighting is controlled at a twelve-button plate near one entrance, three selector switches acting as masters for the color lighting. Dimmers are also provided on the color lighting circuits. These dimmers are located in a metal cabinet in the outer wall and are ventilated by means of louvers opening out on the porch. Knobs to control the dimmers are placed on the interior wall and can be turned at will.

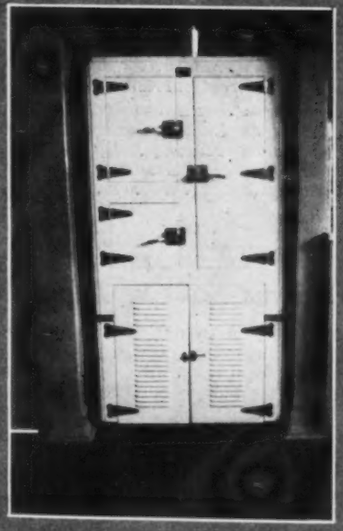
Other electrical equipment in the house includes an 8½-kw. range, 5-kw. water heater, 25-kw. in air heaters, an electric refrigerator, dish washer and miscellaneous appliances. The house is equipped with interphones and annunciator systems. Musical equipment consists of an all-electric radio with numerous loud speaker outlets and a reproducing baby grand piano. In all, the value of wiring and appliances, exclusive of the fixtures in this home, exceeds $5,000.

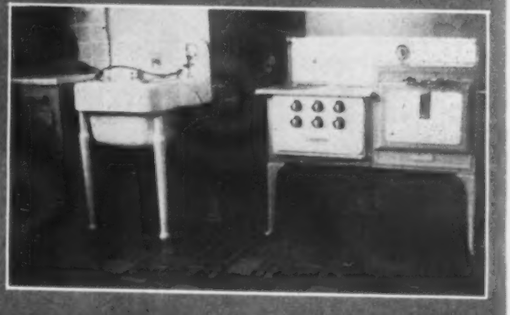
Its lighting reflected in the waters of the lake at night, this home makes a prominent landmark in the vicinity of Elsinore. Moreover its electrical equipment sets a standard by which other homes being built in the vicinity are being influenced. Other contemplated residences in the district are also being planned all-electric and Red Seal.



Modern Elsinore Palace Is Home of Comforts Electrical

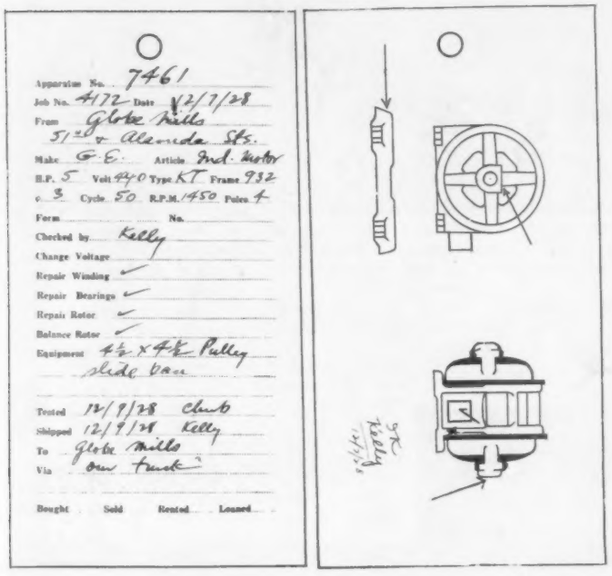
THE CORLIN home at Lake Elsinore, Calif., is the utmost in electrical effects and conveniences. At upper left, the dimmer control knobs, next to the fireplace, from which colored cove lighting is manipulated at will. Upper right, the den with its electrical heater. At left, the living room, cove lighted; above the arches is a sunburst of color. Below (center), a corner of the patio with its electric fountain and lighting standard. Below (right), from the veranda platform, looking over Lake Elsinore. Note the lighting fixture and convenience outlet plates on the face of the wall. At the bottom of the page (left), the refrigerator in its own special cove. Center, an electrically opened door; telephone in a niche beside it, and main switch cabinet open showing its Red Seal. At right, in the kitchen, showing range and dishwasher.





MOTOR

for and by Motor Men in the Interest of a Better Motor Trade



Information Kept on Motor Repair Tag

A MOTOR repair card recently adopted by the Quality Electric Works of Los Angeles serves to prevent mistakes in re-assembling the parts after motors have been repaired. When a motor arrives at the shop for repairs the "check-up man" notes on front of card (Fig. 1) what repairs are to be made, and the other usual data. On the back of the card (Fig. 2) he notes, by means of "arrows," the "turn" of the bells, location of pulley end (facing terminal box) and location of belt tightening screw. The card is provided with a stout metal eyelet so that it may be hung on a hook over the bench where repairs are being made, or it may be attached permanently to the motor until ready for shipment. The adoption of this card has eliminated many former sources of trouble by assuring that the motor will be re-assembled as originally received.

For Night Trouble—a Card and a Window Sign

NIGHT PHONE NUMBERS

to be called when you want emergency service at night or on holidays or Sundays.

HUmboldt 8541 OLympic 7108
HUmboldt 1412 OLympic 2570
HUmboldt 2424

During the week, between 8 a. m. and 6 p.m. always call
LAkeside 1202

Hang this card in a conspicuous place and it will save time for you in emergencies.

PACIFIC ELECTRIC MOTOR COMPANY
10th and Oak Streets, Oakland, Calif.
Consulting and Construction Engineers

As California Electric Works in San Diego does it.

Consider Motor Types and Uses

IT MAY be desirable at this time to compare the general characteristics of various types of motors available. While the present tendency is toward general adoption of alternating current motors, there are still a great many direct current motors in operation, and in many isolated plants that is the only current available. For that reason we will first consider the different types of direct current motors.

The shunt wound direct current motor will maintain good regulation after having reached full speed. However, its starting torque is comparatively low as compared with the compound or series types. If the load to be driven can be applied gradually after the motor is up to speed, and contains no machines imposing violently fluctuating demands, the shunt wound motor may meet the requirements very nicely.

The excellent speed regulation and lower first cost make this motor a very desirable investment in many cases. In a great many laundries, bakeries, machine shops, confectioneries, wood-working shops, etc., this type of motor has been rendering continuously excellent service for years.

The series direct current motor has radically different characteristics from the shunt motor. The disposition of the windings is such as to allow the total armature current also to energize the field magnets. The series motor has high initial starting torque which makes it the ideal medium for handling loads possessing great inertia or of violently fluctuating character.

However, the speed varies widely with changing load and the use of this motor is only practicable where manual control is possible. Examples of types of duty to which this motor is suited are: cranes, hoists, winches, etc., and for fixed loads such as blowers and ventilating fans.

The compound wound direct current motor possesses, in varying degree, the leading characteristics of both the types covered in the preceding paragraphs. The degree of compounding employed regulates the characteristics which will predominate. Compound wound motors are suitable for use with almost any type of driven machinery. This type of motor can be used where good torque and inherent speed regulation are necessary.

Among the many classes of machinery for which this motor is suitable may be mentioned: punches, shears, planers, drop hammers, compressors, printing presses, wood-working machines, grist mills, rolling mills, cooperage works, etc.

The squirrel cage induction motor operates at constant or fixed speed as does the direct current shunt motor. Such motors are made in three types: single-phase, two-phase and three-phase.

The single-phase type usually is made self-starting by means of phase-displacing windings or devices, or centrifugally operated cut-outs. In some of the larger sizes of the older designs a clutch pulley is supplied to connect the load to the motor after full speed has been reached. Single-phase motors should not be used on loads subject to violent fluctuation or those having heavy moving parts where the inertia must be overcome in starting.

Polyphase motors will develop a torque which is largely in excess of the running value. This type of motor will stand exceedingly heavy overloads for short periods of time. Good speed regulation and greater simplicity make these motors much more desirable than direct current motors.

Where speed control is necessary various types of **multi-speed** and **wound rotor** polyphase motors are available, and in most cases can be used to duplicate the results formerly obtained only with the direct current types. The various types and uses of alternating current motors will be covered subsequently.

Torque and Starting Duty

Wherever electric motors have failed to meet their required duty, this failure invariably can be traced to selection of types not having proper speed, horsepower, torque or general characteristics needed to meet the requirements of the driven machine. We have already considered the typical characteristics of both d.c. and a.c. motors in the preceding paragraphs. A knowledge of horsepower and torque calculations, and the selection of motors to meet different power service demands, should be had by the motor dealer. This knowledge will enable him almost invariably to recommend the proper motor to meet the requirements.

A review of these calculations may prove of benefit to some who may have forgotten the methods involved.

TABLE A
Full Load Torque of Motors in Foot-Pounds

	Revolutions Per Minute					
H.P.	2,500	1,875	1,800	1,500	1,200	800
	Foot-Pounds Todque					
1/15	0.14	0.1865	0.1945	0.233	0.292	0.437
1/10	0.21	0.28	0.292	0.35	0.4375	0.656
¼	0.525	0.7	0.73	0.875	1.094	1.64
⅓	0.07	0.73	0.973	1.166	1.458	2.19
½	1.05	1.4	1.46	1.75	2.187	3.28
⅔	1.575	2.1	2.19	2.625	3.28	4.92
1	2.1	2.8	2.92	3.5	4.375	6.56
1½	3.15	4.2	4.38	5.25	6.56	9.84
2	4.2	5.6	5.84	7.0	8.5	13.12
3	6.3	8.4	8.76	10.5	13.125	19.68
4	8.4	11.2	11.67	14.0	17.5	26.25
5	10.5	14.0	14.6	17.5	21.9	32.8
7½	15.75	21.0	21.9	26.35	32.85	49.2
10	21.0	28.0	29.2	35.0	43.8	65.6
15	31.5	42.0	43.8	52.5	65.7	98.4
20	42.0	56.0	58.4	70.0	87.6	131.2
25	52.5	70.0	73.0	87.5	109.5	164.0
30	63.0	84.0	87.6	105.0	131.4	196.8
35		98.0	102.2	122.5	153.3	229.6
40		112.0	116.8	140.0	175.2	262.4
45		126.0	131.4	157.5	197.1	295.2
50		140.0	146.0	175.0	219.0	328.0

—G.E. Co.

The "turning moment" or torque in an electric motor is defined as the pull or drag at the surface of the armature multiplied by the radius of the armature, the term usually being expressed in foot-pounds (or pounds at 1 ft. radius).

Torque = PR
P = Force expressed in pounds.
R = Length in feet of lever arm through which force (P) is exerted.

Full load torque is the turning moment required to develop normal horsepower output at normal speed. The torque of any motor at any output with a known speed may be determined by the formula:

$$(1)\quad T = \frac{5{,}250 \times \text{hp.}}{\text{r.p.m.}} \text{ or } T = \frac{\text{b.hp.}}{\text{r.p.m.}} \times 5{,}250$$

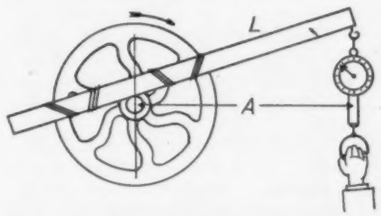
Table A (given herein) shows the full load torque of various motors at six standard d.c. speeds. To illustrate the use of the formula given above, Table A shows the full-load torque of a 5-hp., 1,800-r.p.m. motor to be 14.6 lb.

$$(2)\quad \frac{4{,}250 \times 5}{1{,}800} = 14.6 \text{ lb.} \quad \text{(proof)}$$

Torque alone is only one factor of horsepower—speed and time determine the rate of work performed, or horsepower. Where the foot-pounds torque is known, the horsepower at a given speed can easily be determined by the following formula:

$$(3)\quad \text{hp.} = \frac{T \times \text{r.p.m.}}{5{,}250} \text{ or inverting (2) as above:}$$

$$\frac{14.6 \times 1{,}800}{5{,}250} = 5 \text{ hp.}$$



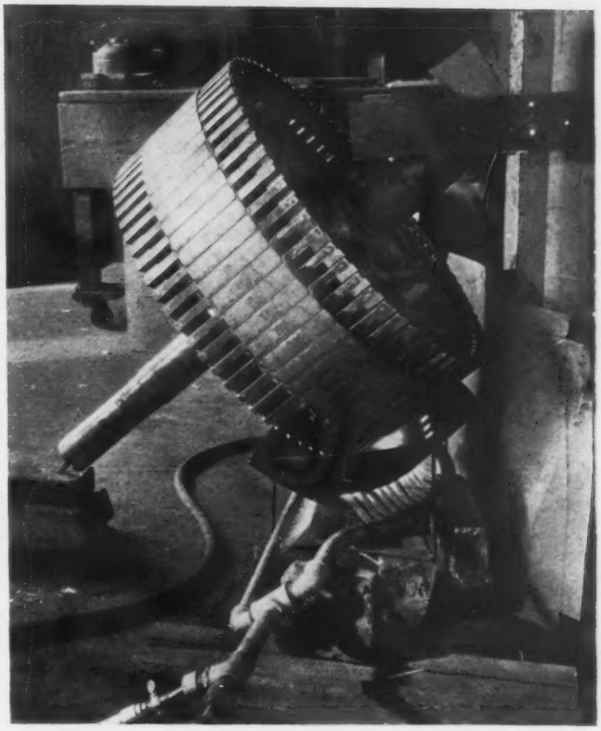
For those who perfer the familiar Proney brake formula:

$$(4)\quad \text{hp.} = \frac{2 \times R \times 3.1416 \times W \times \text{r.p.m.}}{33{,}000} \quad \text{where}$$

R = Radius in feet at which pull is exerted (as in A in Fig. 1)
W = Pounds pull as indicated on scale.
2 × R × 3.1416 = circumference of circle through which the pull would act if lever (L, Fig. 1) and the scale were free to revolve. [The length of this circumference in feet × weight = ft.-lb. (work) per revolution × r.p.m. = total ft.lb. per minute. To get the equivalent horsepower, divide the final result by 33,000.]

(To be continued.)

FORUM



Pan for Soldering End Rings on Rotors

IN THE repair of old motors whose end rings need soldering, C. C. Clardy, motor specialist of San Diego, many years ago devised an ingenious method whereby he could weld many joints at one operation. New motors, electrically welded, are not in need of this process. Old motors, still serviceable, may be treated by this method.

As shown in the illustration, a pan of heavy sheet iron shaped for the rotor is fashioned. In this is placed the soldering metal. Two pipes are bent, shaped about the pan and drilled with forty holes about 1 in. apart with a No. 9 drill. A simple make-shift frame is built up to hold the rotor in place. The pipes are connected together as shown and gas brought to the improvised burner thus made by means of a piece of ordinary garden hose. For an air jet a ⅛-in. OD copper tubing is piped in to a tee fitting as shown.

The rotor is cleaned thoroughly before soldering and the resultant job is very smooth and efficient. Likewise the soldering is accomplished without heating the rotor itself to any appreciable extent. The pan made by Mr. Clardy was devised by him eight years ago and is still serviceable for these particular types of jobs.

Hard Vitreous Insulation by Baking Varnish

FOR INSULATION and protection of windings in motors rewound by them, Backstrand Brothers, of Riverside, have adopted as standard the following practice: All motor parts after winding, including the motor frame itself, are given a coat of Chinalac varnish and placed in a bake oven for from eight to twelve hours. This particular varnish, baked out in this manner, gives the entire motor and frame a vitreous hard finish which so completely insulates the motor that one such job is used for demonstrating purposes in the window. This motor has been in a bath of water for four years and is run under water continuously. The temperature used in the oven is from 115 deg. C. to 125 deg. C.

WHAT is an Estimator? The old style model depended upon his abilities as a barber to shave each bid a little closer. He got the jobs by amputating them. Today a modern estimator is something of an engineer in a practical way, something of a work superintendent, and more of a salesman. ¶ The old style estimator used to worry a great deal over labor data. He was looking to see if somebody could perform a certain operation cheaper than his best skilled men had ever done it—so that he could use this new low figure in the next bid. ¶ The present-day estimator knows that, at best, labor data can only hit an average. Chances are good that the average will prove low. Therefore he plans to get enough plus a margin for labor and sell his job on organization, reputation and layout. ¶ Layout means knowledge of his client's problem, knowledge of how to solve it electrically and mechanically, and knowledge of the convincing kind, of why the superior job pays, and how. ¶ Because Mr. Wilson is that kind of estimator ELECTRICAL WEST *has asked him to furnish a new short series on Illumination. Like its forerunners, it will be practical first. It will be from the estimator's and the contractor's viewpoints. It will be in the estimator's language—short, concise, every sentence counting. It will be profusely illustrated. ¶ Its chief objective will be to bring together data and ideas from all sources, rather than a striving for mere novelty. Much of its data will be assembled from manufacturer's pamphlets, data sheets, diagrams, etc. Wherever known the source will be given credit. Where not specifically credited for any reason both Mr. Wilson and* ELECTRICAL WEST *take this occasion to make grateful acknowledgment. It will be used, it is hoped, in a way to benefit the industry through increased knowledge and usefulness.*

LIGHTING JOBS —*Any Money in Them?* —*How Do You Get Them?*

Treated for the First Time From the Estimators' and the Contractors' Standpoints—Practical Data, Easy to Understand, and Helpful in Selling Better Jobs at a Profit.

A New Short Series —

By J. R. WILSON*
Quality Electric Works
Los Angeles, Calif.

— On Estimating and Layout

THE installation of wiring for "light" was the original foundation on which the electrical contracting business was built.

Today 99 per cent of the business of many electrical contractors is represented by "light wiring."

But the old hit-or-miss system of "one over here, and one over there" has been supplanted by scientific methods of calculation.

These calculations have been so simplified that electrical contractors and estimators may use them with the assurance that a satisfactory installation will result, if an intelligent survey of the structural conditions and type of occupancy have first been made.

For the electrical contractor who desires a reputation for quality and a reasonable profit on his work, the science of illumination offers an unlimited field.

To be a source of satisfaction, both to the customer and to the contractor, an installation must be planned and checked step by step.

This rule applies whether the installation be a small show window, a large store, an industrial plant, or any other type of illuminating job. Each component factor must be given adequate consideration if the final result is to be correct from the standpoint of efficiency and durability.

The Possibilities

Lighting is the foremost service electricity renders. Present-day standards of lighting are making obsolete many forms of equipment which were formerly considered the last word in efficiency.

Thus the contractor is afforded an almost unlimited field of replacement in the older jobs. This is in addition to the enormous amount of new construction which is going on daily.

Good lighting (whether in stores, offices or factories) pays a high rate of interest on the investment, because it increases sales, efficiency and production.

Greater efficiency and lower production costs are the only efficacious weapons with which to meet present-day competition and keen selling methods.

Correct illumination also serves in large measure to decrease labor turnover, that ever present bug-a-boo with which all lines of manufacture are infested.

Recent surveys show that the sale of better lighting has hardly begun—that virtually no impression has as yet been made upon the enormous field of possibility. These surveys show that of the hundreds of thousands of stores, less than one in twenty is even REASONABLY well lighted.

All in His Favor

The contractor attempting to sell BETTER lighting has all of the argument in his favor. If due consideration is given to the "coefficient of utilization" (a factor which will be fully ex-

* All rights reserved.

plained later) of the type of fixture recommended, increased illumination at lower proportionate current consumption can be predicted without question.

It sounds like a paradox, but it is true nevertheless that power utilities are spending money to educate their consumers in the use of lighting equipment which gives more light per watt consumed.

Consider the question of lamps alone. Statistics show that this country spent $500,000,000 for lighting in 1922. If the type of lamp used in 1902 had been used, the bill would have been $2,000,000,000.

Perfect vision is the most priceless gift anyone can have. Poor lighting will ruin eyesight more quickly than almost anything else.

Among 10,000 factory employees a recent investigation showed that 5,300 had faulty vision. Such faulty vision runs up the daily cost of production and increases the possibility of accident.

Correct lighting is the only adequate remedy for such a condition, and the contractor's job is to sell this idea to his customers. He should find that his selling efforts are materially aided by the campaign of public education being carried on by the public utilities, the lighting fixture manufacturers and the lamp manufacturers.

The modern merchant realizes the sales appeal contained in good lighting.

It is a normal human trait to seek the best lighted streets—especially in these times when night driving of automobiles is so universal. Pedestrians, too, choose those streets which have the best lighted show windows.

The merchant who is paying a large store rental readily realizes that his show windows are among his greatest assets.

To decrease the advertising value of these windows, due to poor illumination, is one of the worst mistakes any merchant can make.

Notice the windows of the modern jewelry stores, especially in the larger cities. THEY know the value of light as a factor in creating a "desire to have."

To the live contractor, every store in his community is a potential customer for increased lighting, both in the store and in the show windows.

He should make his slogan "10 foot-candles or more," and not rest until he has accomplished his objective. A series of tests conducted in three different stores showed the following results:

100 persons stopped to look at a display lighted with 15 foot-candles.
133 stopped with 40 foot-candles.
173 stopped with 100 foot-candles.

When the value of a window is figured in dollars per day or per week, the relation between foot-candles, observers and possible buyers is obvious.

A Local Case

If data on test cases somewhere in the East are unconvincing or bring forth the well known, "Well, conditions are different out here," the Long Beach test case of the Commercial Lighting Committee of the P.C.E.A. should be convincing.

The test was made in a jewelry store. Under the original lighting the average percentage of passers who were attracted to the windows was 17.5 per cent. The poorest night showed only 10.3 per cent. The best night was 20.1 per cent.

After putting in good, well-laid-out lighting the average of those passing the windows who stopped was 46.8 per cent, with a low of 44.9 per cent and a high of 48.7 per cent.

In other words the original windows had a drawing power of less than one passerby out of every five.

With the higher standards practically every other person—one out of every two—who passed the window, stopped.

Even before the test had progressed very far the merchant volunteered this expression:

"If any merchant ever wishes to know what improved lighting can do toward building up his sales, refer him to me and I can remove all doubt from his mind by reciting my own actual experience."

And one estimator in Sacramento sat out in a car with a checking device in front of several stores, took the results to the store owners, sold them new lighting, checked results afterwards, and used the data to sell still other jobs. So it can be done.

The commercial field is not limited to window and interior lighting.

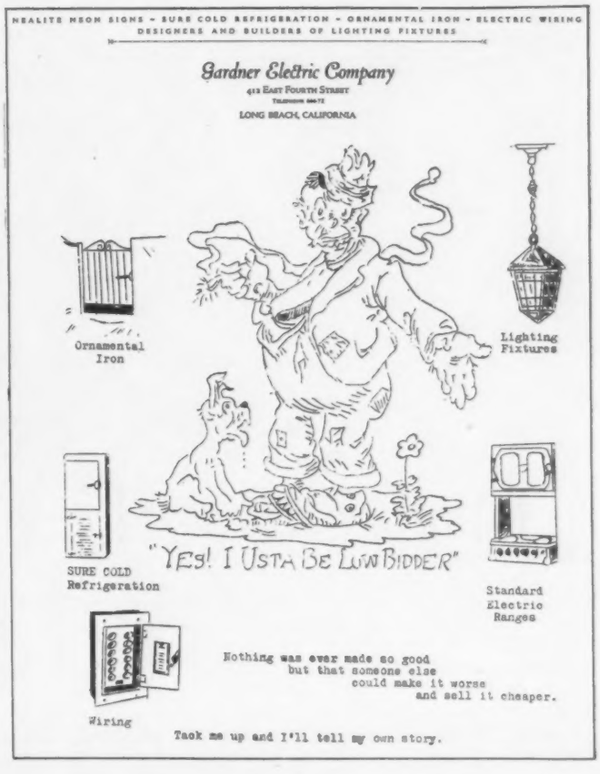
Outline lighting, signs and flood lighting each offer their source of possible profit to the electrical contractor who makes a determined drive for the business in his locality. As one authority aptly says, "Light points right to the store of the merchant who uses electric signs. It says, 'Stop! Look! Loosen!'"

A case in point: A merchant on a side street had an attractive electric sign installed. It cost him the equivalent of two months' rent, but a month after the sign was installed his business showed an increase of 162 per cent, second month 174 per cent, third month 178 per cent, fourth month 180 per cent.

Another commercial prospect is the older type of office buildings. Offices in general are poorly lighted. Tests have shown the speed of reading to be increased 64 per cent when the illumination was increased from 4 to 25 foot-candles. Office work can always be done quicker and better when adequate illumination is provided. In a test recently conducted in a post-office, employees working under 2 to 3 foot-candles lighting had less normal vision and more eye defects than employees in another office where 3 to 4 foot-candles prevailed. Also, letter separators increased their speed 4.4 per cent when the illumination was increased from 3.6 to 8 foot-candles.

"They Won't Make a Tramp Out of Me"

So declared Mr. Gardner, of Long Beach, and to make his declaration of independence from low bids known to all his customers and prospects, he sent out the letter in pictures shown at the right. With a little good humor in cartoon form he thus told more eloquently than he could have done in any number of words that he was not interested in bidding low. The contrast was provided in the little drawings of the lines handled. An impression of quality was given at the same time.


NEALITE NEON SIGNS - SURE COLD REFRIGERATION - ORNAMENTAL IRON - ELECTRIC WIRING
DESIGNERS AND BUILDERS OF LIGHTING FIXTURES
Gardner Electric Company
412 East Fourth Street
Long Beach, California
Ornamental Iron
Lighting Fixtures
"YES! I USTA BE LUW BIDDER"
SURE COLD Refrigeration
Standard Electric Ranges
Wiring
Nothing was ever made so good but that someone else could make it worse and sell it cheaper.
Tack me up and I'll tell my own story.

Better Merchandising

An Attempt to Answer a Dealer's Plea for Help—

"How Shall I Lay Out My New Store?"

His Was a Peculiar Case, But the Principles Used In Meeting His Problem Are Equally Applicable to the Layout of Any Other Store

A DEALER in Reno wrote to a friend —a manufacturer's representative in San Francisco: "I'm just moving into a new store on the first of the month. Can you give me any idea as to how to lay it out? The frontage is only 16 ft. and the store is 140 ft. deep. The door is in the center."

With very little else to start on, this store layout looked like a problem indeed. Only 16 ft. wide and 140 ft. deep! The manufacturers' agent, too, looked around for help. In the process he called Electrical West and a short conversation concerning the possibilities followed. To the editors this seemed an opportunity for the exercise of a little ingenuity, the application of well tried principles to see if they would apply.

Many dealers move to new locations each year. Many revamp their stores. A brief review of ideas on the subject should prove useful, then. Some rather new ideas, developed as a result of conversation with an old-time stage electrician, were thought worth expounding.

This, then, is a summary and a symposium, without claims of originality. Quite the contrary. The old, tested, never-fail principles of display seem to offer the best answers to even this peculiar problem of store layout.

The Objective

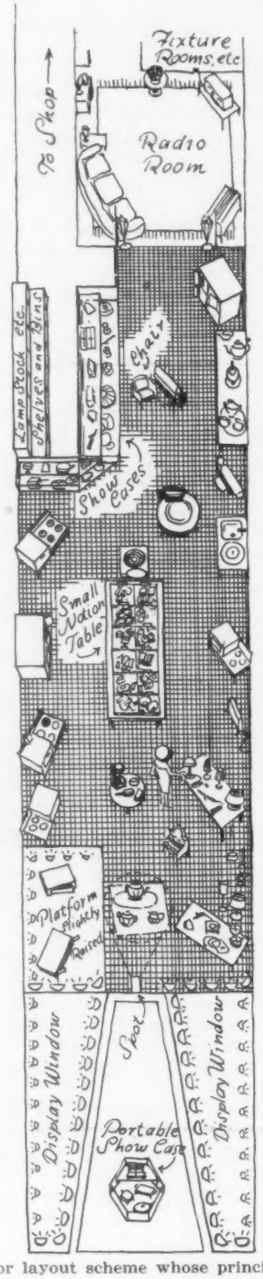
It must be presumed, to start with, that the store is located centrally. The store off the beaten track presented added complications. It must be presumed, to start with, that it is to be a merchandising store, actively in the field to sell electrical appliances, fittings, fixtures, radio, refrigeration, ranges, and perhaps some allied lines.

The object is to: (1) attract people to the store, (2) entice them inside, (3) sell them merchandise.

Attracting Them

He is a poor excuse for an electrical merchant who will not have an electric sign to mark his store. If he does not take advantage of one of the signs offered by manufacturers co-operatively he should have a unique sign of his own. It should be different from any in town, too, so as to be a more distinctive identification.

Likewise, because he is an electrical merchant, certainly his should be the brightest lighted shop in town. Light itself is as attractive to humans as to moths, but it should be used more intelligently by the electrical dealer than by his competing stores in the block.



A floor layout scheme whose principles are explained in this article.

The Subject of Windows

This isn't going to be old stuff. Here are two brand new ideas in the planning of windows. The window, says one manufacturer, costs 20 per cent of the store rent. The department-store man considers his windows worth hundreds of dollars per front foot. Hence these two ideas to make the footage count—and with a 16-ft. frontage this becomes trebly important—are worth considering.

Archie Cline, at San Luis Obispo, has taken a tip from the open marketplace. He paid about $100 to arrange his window so that he could lift it up out of the way. It is worth it, says he.

When a demonstration is held in an ordinary window, he observed, people stop to look, but do not come in. With his window opening onto the sidewalk they come in through it. There is no window reflection in the daytime. Prevailing winds are in the opposite direction. When storms come, the window can come down. On shopping days a girl in this window demonstrating some appliance makes sales, many of them. She can answer questions. She can talk to people. And what a radio demonstration window it makes!

These are a few of its possibilities. New ones occur to him every day.

The other idea is illustrated in the drawing on this page. All too likely the windows of the 16-ft. frontage store were worthless things,—no depth to them, no facilities, no room for display. No doubt they obscured the free view into the store which is so essential. With such windows the merchant might as well wall off 120 ft. of the store behind them.

To sell merchandise, new windows may be a real economy, even if the investment required in putting them in seems high. After all, the cheapest windows will be those that sell the most merchandise.

In rebuilding they should be made as long as possible. Many specialty women's wear stores have windows ex-

tending deep into the store, on angles or running straight back.

Two Rows of Window Reflectors

Two rows of window reflectors will be noted in the accompanying sketch. This may seem like something new—unheard of. Yet it is a principle of lighting employed by the theater. It makes possible the concentration of color on the back drop or wall without flooding the whole window with it. Then a different color, or preferably white, may be used on the merchandise in front. Thus the use of color enhances rather than kills the merchandise, for it acts as a setting in which it is placed.

Just inside the front door is a slightly raised platform, at window height. This makes a second line of display. It can be seen through the window. On stepping inside it attracts the shopper to step in and look. One dealer in Redding, The Shasta Electric Company, uses such a device effectively as a radio, range or heavy appliance display space. It can be made one with the window in front, as desired. Separate lighting facilities give possibilities for special effects.

The Door Spot

The spotlight over the door is one device which every merchant except the electrical has used effectively. When the store is closed at night a small display is set up on the floor, on velour perhaps, in such a way as to come directly in the field of the small spot. The other lighting in the foreground of the store is dim. This little display stands out in contrast. It makes the front door act as another window.

Similarly, at night, a concentration of light on some one object in the rear of the store, while the lighting elsewhere is off, draws the eye into the store. If the store is kept open in the evenings to demonstrate radio the radio room at the rear should attract by its brilliancy.

It might as well be enunciated right here. Light is the best salesman that the electrical dealer can have. It can be made to coax, tease, dramatize, enhance and even sell merchandise. It is the medium best suited to the creation of emotional reactions, good or bad. The electrical dealer should make himself a past master in its manipulation. He will sell more merchandise if he does. He will sell more lighting equipment if he knows what it will do.

A Few "Inside" Tips

The arrangement of the inside store layout shown in the drawing may give the impression that any sort of display will do. On the contrary, the placing of the various appliances and display tables in this case has been deliberate. The position which each occupies is part of a well-thought-out plan.

The first thing to be noted is the absence of show cases and shelving except at the wrapping counter. This places all merchandise on display tables or on the floor. Such an arrangement gives more flexibility in display. These tables and appliances may be moved around often to provide variety in the appearance of the store.

Very few large appliances are set back to the wall. In most cases a slight angle is given them so that they cross the pattern of the squared-off linoleum floor covering at an angle. They are placed so as to catch the eye of anyone entering the store. They are placed in the path of the one entering the store, just enough so that she has to pass among them to reach the rear. This is merely a device to give every person who enters the store the greatest exposure to these appliances that is possible.

Another planned feature is the long table at the center on which are displayed fuses, lamp sockets, plugs, fittings, and other notion counter items. This facilitates picking up and examining. It makes choice easy. It reminds the purchaser of little forgotten needs. Like the lamp merchandising table, near the front of the store, it sells its merchandise without sales effort.

A Chair at the Ironer

The chair and ironer at the wrapping counter are deliberate. If the customer must wait a minute to have something wrapped or while something is being brought her from the repair shop in the rear, she is asked to seat herself comfortably. The ironer is right in front of her, and she cannot help getting the suggestion that ironing while sitting down comfortably must be a rather nice thing.

While seated, too, her eyes are more in direct line with the interior of the show cases. It is in these cases that the colorful, jewelry appeal type of appliances may be displayed to best advantage. Upon her inquiry concerning such appliances the clerk may take them from the show case with all the reverence and respect of a jeweler and demonstrate their fine qualities with such an air as to make them the most prized of possessions to own. The number of people who will buy the very best article obtainable just because it is the best, paying any price for the satisfaction of owning the best, is a surprise to any electrical man who has not attempted to sell such appliances.

Radio and Fixture Rooms

So much for the first 60 or more feet of the store. Behind this comes the radio room. This is a comfortable, homelike room, where the radio may be seen in surroundings as nearly approaching the home as possible. The comfortable settee in this room can likewise be made the place where the prospect is made at ease while fixtures, even appliances, are brought to her for leisurely examination.

Some electrical merchants prefer to make this first room a model kitchen; at least to have a model kitchen somewhere in the establishment. It can be placed effectively at the rear of the store. Or, like fixture display booths, it can be placed directly in the rear of the radio room.

The window which moves up out of the way and gives access from the street to demonstrations, etc., is proving valuable to the Cline Electric Shop of San Luis Obispo.

To—Teach Lighting To—Sell Lighting SHOW

Home lighting salesmen being drilled into the fundamentals of the game at one of the school sessions.

HOW better can you teach a staff of salesmen about lighting than by showing them? asked Frank Bevan, lighting sales engineer for the Pacific Gas and Electric Company. How better than by having the actual equipment there to feel, test, look over and fix in mind could salesmen be given an appreciation of the equipment listed in the P. G. and E. sales catalog? These salesmen were expected to sell this listed equipment. Why not let them see it?

Like the practical trooper that he had been, he set about to pick the theater of activities, dig up the props, locate the right sets and put up the show.

It was time to call in all lighting salesmen to give them the year's quotas, tell them the year's objectives and set them hot upon the trail of achievement. But it was more than that. It was an opportunity to let them see and handle and try out the stuff they were to sell. It was an opportunity for the manufacturers of such materials to acquaint these salesmen of theirs by proxy with the fine points, the individual merits of their own particular equipment. It was an opportunity to bring these two—salesmen and manufacturer—together.

It was more than even these. Here was a chance to crack open the big news of the year in lighting. This would be the overture which would find its bigger and more spectacular realization in the jubilee ceremony in October to celebrate the fiftieth anniversary of the lamp.

The P. G. and E. lighting salesmen would not be beginning a celebration in October, Mr. Bevan decided. They would be bringing it to a triumphant finale for that occasion, if he had his way about it.

Manufacturers' representatives joined eagerly in the program. The show idea in connection with the sales school was conceived two weeks before the show opened. When it opened on Monday, Feb. 25, it surprised even its participants, to say nothing of officials of the central station, outsiders and those who decided too late that they should be in it.

The show was open ten days in all. The first two, Monday and Tuesday, were devoted to the domestic lighting school. To this came 32 salesmen and eight supervisors from every part of the company's system. Speakers included R. E. Fisher, vice-president in charge of public relations and sales; H. M. Crawford, general sales manager; R. T. Stephens, manager of electric sales; James R. Cravath, consulting illuminating engineer; C. W. Hatch, supervisor, East Bay division; W. S. Hanbridge, supervisor, San Francisco division; J. S. Ross, sales manager, San Jose division, all of the P. G. and E. Company.

Outside speakers included Walter E. Carlson, Edison Lamp Works; Clark Baker, National Lamp Works of the General Electric Company; and V. N. Hartley, California Electrical Bureau. A feature of these meetings was the practice talks assigned the salesmen themselves, and the tour of the show and demonstration of equipment on display.

On Wednesday and Thursday the commercial and industrial salesmen, sixteen in number, and their eight supervisors, had a similar schooling. To the aforementioned speakers were added Harold R. Owens, Electrical Products Corporation; Carl O. Martin, Benjamin Electric Company; Hugh Wilson, display manager, Lachman Brothers; D. J. Prudhomme, floodlighting specialist, General Electric Company; and Leo Gianini, Edison Lamp Works.

On Friday William P. Bear held a street and airport lighting sales meeting with eight salesmen, four supervisors and several manufacturers' representatives. On Friday noon all company sales managers were entertained and sold on the show. On Saturday morning the Pacific States Electric Company salesmen used the show for a sales meeting.

Thus was the primary purpose of the show served. Under the auspices of the Lighting Bureau, Commercial Section, P.C.E.A., the show was held open for a secondary purpose—that of acquainting numerous other interested groups with good lighting.

General view of the show looking toward the rear. Manufacturers' display booths lined both sides of the passageway.

From the rear, a general view also. Note the stage and classroom at the extreme right, where meetings were held.

Says FRANK BEVAN, *Ringmaster of P. G. and E. Lighting Circus*

LIGHTING

Individual features of the show are reproduced on this page. (1) The Holophane booth which displayed a wide variety of reflectors, domes, prismatic glass and lighting units. (2) The Wuelker "white kittens" provided an unending variety of colored lighting effects and possibilities. (3) The stage for the classes was a complete Duplex-a-lite display. (4) Curtis X-Rays in a model window demonstrated color, spot and general lighting at will. (5) The modernistic touch was provided by Frink in a sheet-metal framed window with changing color effects. (6) At the rear of the show room—industrial equipment in foreground and ceiling, street, highway and airport lighting along the walls. (7) Westinghouse made an effective display in compact space. (8) The Edwin F. Guth booth made a feature of indirect and hospital lighting. (9) Pacific States with its Ivanhoe commercial and domestic lines.

"Now Go Forth and Get Old Man Bogey"

Spectacular in every detail, with movies taken of the entire proceedings, plays, dramatized and illustrated acts and talks, the Southern California Edison Company launched its last range campaign with a record-breaking sales convention.

WITH more than 200 Southern California Edison Company officials and members of the sales organization in attendance, a two-day Hotpoint range campaign was held at the Hotel Huntington, Pasadena, Oct. 3-4. W. L. Frost, general commercial manager of the company, was the convention chairman. Every single minute of the two-day session was devoted to the idea of making possible the sale of 2,000 ranges during the campaign. This was the biggest merchandising sales meeting ever held by the Edison company.

Opening at 11 a.m. Wednesday morning Oct. 3, events followed one upon the other with lightning rapidity and there was no halt in the proceedings until Frost dismissed the gathering Thursday afternoon.

The Wednesday afternoon session, with R. W. Turnbull, Pacific Coast sales manager of the Edison Electric Appliance Company, acting as chairman, was devoted to a recapitulation of the 25 years of harmonious and profitable relationship between the Hotpoint organization and the Southern California Edison Company. W. A. Dannenhauer, manager of the range campaign department of the Edison Electric Appliance Company of Chicago, spoke on the history of electric cooking. Mr. Dannenhauer came to the Pacific Coast expressly for this campaign and his story, illustrated, showing man's progress in the preparation of food from the stone age on to the present time, was extremely well received.

The Wednesday evening session was given over to entertainment features all of which, however, pointed to the campaign objective of 2,000 range sales.

Beginning at 7:30 on Thursday morning with a "Pep Breakfast" the Thursday program was strictly business. H. C. Rice, merchandising manager of the Edison company, presented the campaign plan in full to the convention. No information had been allowed to get out prior to this with reference to premiums, prizes, quotas, advertising helps and other pertinent factors concerning the campaign. Following Mr. Rice, R. G. Kenyon, assistant advertising manager of the Edison company, outlined the advertising plan for the campaign.

Speaking on the subject, "Sales Opportunities," R. W. Turnbull, in his characteristic manner, offered a glowing vista of the future in store for the sales-minded individual in the public utility business.

Bringing this business session to a proper close, a tremendous figure of a terrible looking creature labeled "Old Man Bogey" was introduced to the audience and the various sales supervisors of the Edison company had an opportunity to express their contempt for this mythical creature. As these sales supervisors expressed their thoughts about Old Man Bogey, they fired at him from various parts of the audience. Arms, legs, head and body all fell to the floor and pallbearers brought a black casket in which they carried away Old Man Bogey.

Old Man Bogey himself, before his massacre in effigy by the sales forces at the convention, and his later actual slaying in the field during the campaign.

W. L. Frost, as he did with every sales manager and salesman, charged P. J. Denninger of the Whittier district, oldest district manager in point of service with the company, with the commission of slaughter of Old Man Bogey.

Indicating the active interest which the officials of the Southern California Edison Company are taking in the commercial program, the following were present at the final luncheon session: John B. Miller, chairman; R. H. Ballard, president; G. C. Ward, executive vice-president; F. B. Lewis, vice-president and assistant general manager; F. G. Hamilton, manager of operation; and W. C. McWhinney, assistant general commercial manager. With these were W. A. Dannenhauer, P. H. Booth, R. W. Turnbull and D. A. Richardson of the Edison Electric Appliance Company.

At a luncheon held at the Hotel Huntington on Friday, Oct. 5, 22 enfranchised Hotpoint dealers were present to get the story of the campaign at first hand.

At this meeting H. C. Rice, R. G. Kenyon, R. W. Turnbull, W. A. Dannenhauer and P. H. Booth outlined the program. C. J. Geisbush, secretary-manager of the California Electragists, spoke.

In order to attend a second dealers' meeting which was held in Visalia Saturday afternoon, Oct. 6, Dannenhauer, Geisbush, Rice and Kenyon took advantage of the Maddux Air Line and flew up to the San Joaquin Valley district on Saturday morning. This was the first time that the Edison company has made use of air transportation in its sales activities.

Bills as Evidence That "Electricity Is Cheap"—Illustrating a complete twelve-months electrical bill for two typical domestic installations, photographs are used by the Southern California Edison Company merchandising specialists with their prospects for sales of electrical appliances. In addition to the Edison sales force all contractor-dealers in the Edison territory are to be furnished with these sales helps.

Told at Two Refrigeration Conventions

General Electric District Meetings and Frigidaire Pacific Coast Sales Meeting Show Trends in Refrigeration Sales for This Year

ELECTRIC refrigeration is now a big business and its sales conventions are big shows. The organization of one of these shows, in all of its ramifications, is becoming a new art. Salesmen are no longer given an order book and sent out cold to the doorsteps of the nation. Every year they are mobilized into camp, drilled, pumped full of information, inspired and sent forth as upon a new crusade, to do deeds and bring back orders.

Two large refrigerator manufacturers held such meetings during the past month on the Pacific Coast. An adequate description of them would require a volume. Out of them have come certain facts and ideas more spectacular or more valuable than others. A few of these may prove of assistance to any dealer or salesman selling refrigeration of any kind.

The Frigidaire Meeting

At the Frigidaire Pacific Coast convention everything was acted out—demonstrated—in person. By means of dramatic sketches salesmen were shown the right and wrong ways of making a sale from the point where the customer is approached to the final delivery of the machine. First came rewards to salesmen, honor and gold recognition of excellent work, stimulation for next year. Inspiration and enthusiasm were engendered. The value of friendly sales competition for honors, the club idea, where membership comes only from achievement, were brought out.

The background of research and engineering behind the product was given by the chief engineer—demonstrating as he went the improvements contributed by this effort. Temperature control became a new feature. Its necessity was convincingly told by the home economics expert. The control mechanism as an engineering feature and the temperature-prescribed recipes of the home economist were welded into a big selling argument.

New products were announced. After setting forth the need of the nation for a certain product, the curtains parted to reveal the new achievement—a room cooler, a water-cooler, with units in multiple, giving a market in every home already equipped with an icing unit for this new feature at small expense and opening up countless new markets, commercial units to fit odd spaces and new cabinet models of beauty and special feature.

Then came a dramatized presentation depicting the advertising support and dealer-helps to be provided. Dealers were offered electric signs for but a quarter of the cost of erection and sign, on easy payments without interest. After the magazine and newspaper advertising coverage had been analyzed the importance of direct-mail on difficult prospects was acted out and a well planned campaign of direct-mail offered dealers at one-fourth of cost.

Likewise was demonstrated the selling portfolio which serves the salesman as a display cabinet, its own covers forming an easel. With this the demonstration and sales effort may be carried forward expeditiously. Boiled down, effective sales arguments, none of which need be memorized, are printed on them, to be read off and given meaning by the demonstrator while he shows his machine. The first section of this portfolio tells the need for electrical refrigeration. The second shows each model available. The third section gives closing arguments and ends with the easy terms appeal.

A FEW of the many sales ideas and selling helps offered by manufacturers of electric refrigerators to aid in this year's campaign are told briefly here. Application of these plans and ideas will mean a stimulated refrigeration market. New lines of products will open new markets and make many previous users potential customers for new products. Electric refrigeration looks forward to its greatest achievements this year.

A combined order blank and time payment contract, requiring but one signature, brought applause. Likewise, a credit information card was brought forth by the acceptance organization. Present users are to receive literature designed to help them sell to their friends.

A clever illustration told better than words the fact that the use and treatment of a refrigerator must be explained by the salesman and not left to the service department.

An allegory, well acted, dramatic and convincing, told that there was no secret formula by which sales could be made without work, but set up the formula that:

Five calls make possible one interview,

Two and a half interviews make possible one demonstration, and

Four demonstrations result in one sale.

Competition with other makes was not mentioned. Competition with the company's own past record was set up as the greatest challenge facing it. Only one or two good-humored references were made to other products, and then only in demonstrating how such comparisons might be avoided, and attention concentrated where it belonged—on making a sale.

It was gratifying to learn that the Pacific Coast led the entire nation in refrigeration sales, that in the first two months this year more sales had been made by a half million dollars than during the whole of last year.

General Electric Story Told by Movies

Another line of attack was shown at the series of meetings held by the General Electric organization, one in the headquarters of each district sales executive. Moving pictures, well prepared and presented, were relied upon almost entirely to carry the story of new development, new products, operating features, advertising plans, promotion and sales methods.

To announce the new small model, a "Treasure Chest" build-up in advertising was outlined. National advertising was shown also.

Particular interesting is the plan to stage national broadcast hours on the radio on behalf of this refrigerator.

Other advertising and selling features included a sales correspondence course which all salesmen will be required to take; window helps and signs; a magazine which is to go to all users of refrigerators to help them sell others, another to salesmen and a third to utilities; a small electric clock modeled after the refrigerator which is to be given to users who turn in names of prospects which are not already listed and to whom a sale is made; a card index prospect file system; recipe books; an architects' data book to be placed in the hands of every architect; and many other similar promotional ideas. As a rule all of these are to be paid for by the district sales organization or dealer.

Pep meetings were declared to be not nearly as productive of results as educational meetings for salesmen. The "canned speech" was upheld as necessary and far better than an unprepared sales attack in which the salesman tries to meet the situation as he goes along. The qualification was made that the sales talk must be learned so well that by pausing and seeming to grope for the right word occasionally it has all the effectiveness of spontaneity. The salesman, it was declared, can command the situation better and can more effectively direct the entire procedure if he is not actually groping for thoughts or words with which to meet any situation.

Sales, it was pointed out, are based on three fundamentals: (1) knowledge of the product and its special features, (2) a knowledge of how to sell it, and (3) a knowledge of who buys it and why—in other words, a knowledge of the market.

Give explicit directions on how the appliance should be treated

Are You Making Your Customers—

"Quality Minded"?

The Manager of a Large Household Goods Store Tells How and Why it Should Be Done

AN EXPRESSION frequently heard in aeronautical circles today, in furthering the cause of aviation, is "making the people more air-minded." This expression, if paraphrased "making the people more quality-minded," cites a great need in electrical appliance circles for increased selling and higher standing, according to many prominent electrical merchants.

L. B. Goldsmith, promotion manager for Nathan-Dohrmann Company, San Francisco, declared that quality merchandise is the first essential in electrical appliance progress, and as this company has built up a gilt-edged reputation in its 78 years of supplying the public with household utilities, his statements merit consideration.

"This organization is absolutely against all cheap, shoddy, makeshift articles that are called electrical appliances," he said. "From our standpoint of building up a permanent reputation nothing is more destructive to the electrical industry than unadvertised, poorly constructed, inefficient commodities."

"How do you educate the public against buying these cheap appliances?" he was asked.

"By refusing to carry them," he said. "We explain to customers that in the long run they save money by purchasing standard appliances backed up with a reputation. Our selling staff is educated, both on the floor and at weekly meetings, always to talk quality. Our experience has been that people do not went these cheap, unsatisfactory products but they must be enlightened on the difference. To the uninitiated one toaster may look just as good an another in the window, but when their relative merits are explained, people will buy the better appliance. Our most expensive toaster, for instance, sells in greater volume than any other we have in stock.

"Another highly important factor in building up a trade is to give explicit directions on how an appliance should be treated. Too many dealers let the customer depend on the printed instructions, which is not the way to sell an electric appliance. The sales person should be thoroughly conversant with what the article can do and how it should be cared for. For example, in selling a waffle iron we stress two points: first, that the iron must be very hot in order to make good waffles, and second, that an occasional greasing is necessary for perfect operation. Sometimes a waffle iron will stick when used for the first time and the customer, believing it should never be greased, will take it back to the store in disgust and always afterwards she will feel antagonistic toward that waffle iron, when with proper treatment it would have given absolute satisfaction. Don't lead a woman to think that she never has to grease a waffle iron.

"'Nothing but the truth' should be the watchword of the dealer," Mr. Goldsmith stated in this connection. "Just as the dealer should state the advisability of occasional greasing of the waffle iron, so he should be exact in his assertions regarding other appliances."

The reflector type of electric heater was cited as an example. "Many dealers in selling this heater say that it will heat a room. Now, heating a room is not the purpose of this style of heater; its warmth is like the sun's rays heating only a certain spot according to the direction in which it is turned. To sell this heater with the statement that it will heat a room is not according to the facts and results in dissatisfied customers and loss of future business. If a salesman has studied an appliance and knows its capabilities he can tell the customer exactly what it will do and by so doing will be benefiting himself as well as the user."

Well planned newspaper publicity is another strong factor in successfully merchandising electrical appliances, according to Mr. Goldsmith.

"Your advertising must have definite appeal," he said, when asked what he considered well planned advertising. "Find out the specific appeal of an article and play that up strong. 'DO YOU LIKE CRISP WAFFLES?' would be a good lead in advertising the waffle iron because the appeal is to the appetite.

"Clever advertising ideas can spring from anywhere. Let me illustrate by a recent advertisement of ours which brought fine returns and had its inception in a seemingly trifling incident.

"A member of our advertising staff was out shopping with his wife and they stopped and bought some lettuce. This was selling three for 10 cents, but the lady bought only one head because she was afraid it would not keep. Now, she previously had been attracted by a certain make of electrical refrigerator which Nathan-Dohrmann's was featuring in a window display and was trying to persuade her husband to buy one. So when she bought the lettuce she turned to him and said, 'If I had that electric refrigerator I could save 5 cents right here.' The young man related the incident in the office and we capitalized

White refrigerators against a black oil-cloth background looked so clean and inviting that several were sold just from the window display.

on it in a newspaper advertisement in which the grocer was shown offering three heads of lettuce to Mrs. Shopper with the remark, 'You may have three for 10 cents, Madam'— followed by the story bringing out the point that an electric refrigerator means economy.

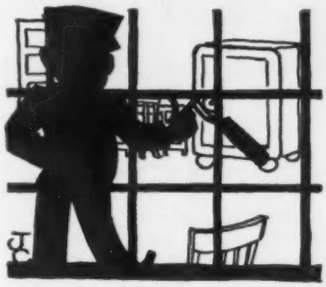
"This indicates what is meant by being specific in advertising. Form pictures in the minds of shoppers and you have good advertising. The same thing applies to selling."

The effectiveness of a good window display was also demonstrated in connection with the refrigerator mentioned. The white refrigerators shown against a black background looked so clean and inviting that they touched a responsive chord in the minds of those who were thinking on the subject of electric refrigeration and even before the newspaper advertising appeared, several refrigerators were sold just from that window display. Then by launching the newspaper campaign and keeping the refrigerators in the window, a good many more were sold.

The importance of close co-operation between the display department and the advertising department was stressed by Mr. Goldsmith. In this store the display manager keeps in very close touch with the advertising manager, watching what is being featured and endeavoring to match it up in a window. Frequently, however, the number of messages to be promulgated is so large and varied that the best they can do is divide their publicity between windows and newspapers.

In establishing a new line through newspaper publicity an organized campaign is the best method, according to this executive's experience. If an advertisement appears once a week in the same paper on the same day, even in the same position, if possible, it enjoys the advantage of concerted attention in driving home the message rather than ineffectually scattering its fire by spasmodic and widespread advertising.

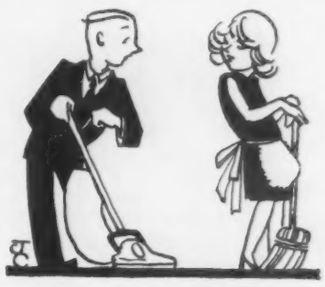
Home Equipment Primer Made Available by N.E.L.A.—For those selling home equipment the recent publication of the General Federation of Women's Clubs, entitled "Home Equipment Primer, Part 5," should prove of particular value. This booklet, very completely illustrated, deals especially with "equipment for homes within reach of the four principal home serving utilities—water works, sewer system, electric light and power service, and gas works." It was prepared to show housewives the country over what methods and machinery were available to apply to "the business of housekeeping." Copies are available through the N.E.L.A. or the Federation of Women's Clubs.



Light is a policeman.

"Electricity Is Cheap— Use More of It"

Last of the talks prepared on this subject for presentation at last year's P.C.E.A. convention, this one by Walter J. Walsh, Great Western Power Company, San Francisco, was not delivered due to illness. It contains many excellent sales ideas.



Slave to a broom.

FEW of us really realize how cheap electricity is. This morning I boarded a street car and for five cents had the service of four 20-hp. motors, or 80 hp., for about 30 minutes while riding to work. One electrical horsepower is equal to the manual efforts of four strong men, consequently I had at my disposal the equipment of 320 manual laborers at less cost than I would have to pay for a cup of coffee in any of this city's restaurants. That is cheap service.

We take so much for granted about electrical service that we have lost our sense of how cheap and economical it is and really fail to realize its value as a servant.

Our original conception of electricity was as a method of lighting. Let us consider the cost of lighting today with the days gone by. A common laborer works about ten minutes a day to earn enough to pay for lighting his home by electricity. Fifty years ago he would have had to work two and one-half hours to provide the same amount of light by means of gas flames, and if he had supplied himself a half-century ago with the same amount of light from candles he would have had to work 24 hours every day to pay his lighting bill.

Now let us look on light as a method of protection. A metropolitan city employs police officers at an average salary of $200 per month, and except for traffic and detective details the bulk of a police department's work is acting as night watchman for sleeping citizens. Burglars, thieves and other night prowlers of various types work in dark or dimly lighted locations and in such localities police officers must be confined to small areas and are always at a disadvantage.

With properly lighted streets at a cost of seldom more than $5 per month per light the criminally minded element generally decides that the risk is too great for the gain to be made and the result is that the police can patrol larger areas and have at least an even break with the criminal. Electricity is a cheap policeman.

Now for electricity as a servant in the home. For ages untold woman has been a slave to her home, until it almost seems that she feels electricity is an intruder when it offers to lighten her burden. A few comparisons will show how efficient it is and how cheap in a money cost.

The average five-room home can be completely cleaned with a vacuum cleaner in about two hours' time at a cost for electric energy of about 5 cents. The same work could not be accomplished with broom, dustpan, duster, etc., in eight hours. An electrical washing machine will in two hours accomplish more than a woman can do by hand in a day's time. An electrical dishwashing machine within fifteen minutes will wash, sterilize, rinse and dry the dishes of a meal that normally would take an hour for a woman; the electric iron and mangle have, with the electric washing machine, taken the fear of Monday's washing out of the hearts of women. The electric range has enabled the lady of the house to leave the kitchen while cooking—even more than that, it has enabled her to place her cooking on the stove in the morning and go out for the day. In the afternoon the stove automatically starts to cook the foodstuffs and when she arrives home she removes the cooked meal from her stove. If she is delayed, the current is cut off automatically and the food is kept warm but not overdone or burnt.

When we consider what electricity will do in saving household labor hours alone, we cannot help but realize that it is cheaper than the cheapest human slave would cost for food alone. If a woman in her home employs a serving girl she must pay her at least $60 and board, which means about $100 per month, or $3.33 per day. On an eight-hour basis a labor hour would be worth 41½ cents. If she does not employ help, her own time is worth at least as much. A little figuring would show that electricity is the only servant that it pays us to use to a steadily greater extent, especially in the home.

In manufacturing it has been conceded by European experts that American leadership is due principally to our faithful, willing and powerful slave, the cheap and reliable electric motor.

News of the Industry

Reorganization of Los Angeles Department Combines Water and Power Bureaus

THE Board of Water Commissioners has announced a reorganization of the Los Angeles Department of Water and Power, with H. A. Van Norman as chief engineer and general manager in charge of the entire department.

Formerly the department has consisted of the Bureau of Water Works and Supply, of which Mr. Van Norman has been chief engineer and general manager since Dec. 1, and the Bureau of Power and Light, of which E. F. Scattergood has been chief engineer

H. A. VAN NORMAN

and general manager. Under the reorganization both bureaus have been abolished and the department is made to function as one body with the Board of Water Commissioners as executives for all, as heretofore, and with Mr. Van Norman as general manager and chief engineer over all. Two new positions have been created: E. F. Scattergood has been made the department's chief electrical engineer and F. E. Weymouth, the department's chief hydraulic engineer. Each of these positions is new. The various assistants and engineering staffs which have served both bureaus up to this time are to be consolidated into one flexible staff, to be used where, when and as needed.

The advantages of having one man in control of the entire department include the centralization of responsibility and control, the elimination of duplications, and the assurance of greater efficiency.

Mr. Van Norman has served the Bureau of Water Works and Supply in various capacities for the past 21 years, this period covering the building of the Owens' Valley Aqueduct, on which he was construction engineer, and the planning of the proposed Colorado River Aqueduct. Prior to this promotion to the position of chief engineer and general manager of the Water Bureau, he served as assistant in both capacities under Mr. Mulholland.

Mr. Weymouth has been assistant chief engineer of the Bureau of Water

E. F. SCATTERGOOD

Works and Supply since March 1, having resigned from the J. G. White Engineering Corporation, for which he had had charge of a large irrigation contract being executed by that company for the Mexican Government. From 1902 until 1924 he had been connected

F. E. WEYMOUTH

with the United States Reclamation Service, the last four years of that period as its chief engineer.

Mr. Scattergood has been chief electrical engineer in executive charge of design, construction and operation of the hydro-electric generating and distributing system of the City of Los Angeles since 1909.

Trade Commission Hears California Witness

Hearings on the publicity phase of the public utilities investigation were resumed by the Federal Trade Commission March 13 when Victor M. Hartley of San Francisco, executive secretary of the California Electrical Bureau, was called to the stand. Mr. Hartley explained that the Bureau started in 1921 as the California Electrical Co-operative Campaign, changing its name in 1925 and becoming an affiliate of the N.E.L.A., as in the case of other local agencies investigated during the hearings. Mr. Hartley has been with the work since its inception, first as an assistant and since 1925 in his present capacity.

Mr. Hartley testified that the Bureau functions as a disseminator of instructive information in California through broadcasts, pamphlets and advertising matter. Regular news bulletins are not sent out to the papers nor has any matter been sent into the schools excepting data on house wiring and farm electrification when requested. Advertising has been undertaken on an extensive scale since the members of the Bureau have realized the need for state-wide coverage of a nature formerly undertaken locally by individual companies. The advertisements inserted in fifteen magazines circulating principally in California carried out the slogan, "Electricity is cheap—use more of it" in an effort to promote home electrification. Most of the advertisements carried inconspicuously some such reference as "electricity developed soundly and economically under private initiative." Beyond that, however, Mr. Hartley stated that no attempt had been made by the Bureau to influence public opinion concerning state ownership or operation. He explained in answer to questions by Judge Healy that one of the chief beneficiaries of the advertising campaign was the City of Los Angeles, whose municipal plant generates and distributes electric power and also purchases energy from the Southern California Edison Company.

The witness stated that the Bureau's membership is composed of four groups, namely, power companies, electrical equipment manufacturers, electrical supply jobbers, and electrical contractors and retailers in the State of California. These have contributed

from $12,000 in 1921 to $48,000 in 1928. Power companies have furnished from 65 to 75 per cent of the total. Judge Healy brought out in his questioning that the California power companies sell electrical appliances through their branch offices. Mr. Hartley stated, however, that the jobber members of the Bureau have caused no conflict on this account.

Mr. Hartley's examination was continued on the following day and related principally to legislative operations of Robert L. Eltringham, at one time manager of the Bureau. The legislalative activities referred to by Judge Healy were in connection with the proposed legislation in California known as the Water and Power Act. The measure was defeated a few years ago.

The witness explained that all such work undertaken by Mr. Eltringham had been carried forward personally by him and was not in any sense related to the work of the Bureau. Replying to Judge Healy, he said that any direct compensation for Mr. Eltringham's political activities or reimbursement for expenses incurred therein did not come from the Bureau or the Bureau's funds. Such expenses, said the witness, if paid at all, were paid directly by companies, the transaction being between those companies and Mr. Eltringham individually. He added, however, that while engaged in this work Mr. Eltringham received his salary as manager of the Bureau.

The hearing was adjourned until March 20. Other witnesses who have been called to testify are A. F. Hockenbeamer, president, Pacific Gas and Electric Company, San Francisco; R. H. Ballard, president, Southern California Edison Company, Los Angeles, and chairman, public policy committee, N.E.L.A.; W. L. Frost, commercial manager of the same company and past president of the Pacific Coast Electrical Association; H. L. Cornish, attorney of Los Angeles; and N. W. Brockett, director of public relations, Puget Sound Power & Light Company, Seattle.

Filing Shows Plans for Two Power Projects in Oregon

The largest filing fee ever paid to the state engineer's office in Oregon, $3,736.68, accompanied a recent filing on the north fork of the Santiam River and Whitewater Creek, Linn County, by the Northwest Power Company, Portland. The filing contemplates two projects, one of 26,636 hp. at the outlet of Marion Lake, and the other on the Santiam, using water also from Whitewater Creek, to develop 42,954 hp. The estimated cost of the two projects is about $6,000,000.

The Northwest Power Company is not known among utility men of the Northwest. The rights involved in the filing were originally held by H. S. McGowan, who later assigned them to J. G. Kelly, who has in turn assigned his interest to the Northwest Power Company.

At the N.E.L.A. Rocky Mountain Conference

These executives of the Southern Colorado Power Company were in attendance at the N.E.L.A. Rocky Mountain Division annual conference held at Pueblo, Colo., in January, a report of which appeared in Electrical West for March 1, p. 184. Left to right they are: W. N. Clark, vice-president and general manager of the company; F. S. Johnson, manager, Rocky Ford district; G. W. Milliken, manager, La Junta district; H. H. Lyons, manager, Ordway district; L. C. Moore, manager, Canon City district; Robert Moos, manager, Cripple Creek district; and E. F. Stone, assistant general manager.

1928 Output of Electricity Shows Gain of 10 Per Cent

Preliminary figures of the total annual production of electricity by public utility power plants in the United States indicate an output of 87,851,000,000 kw.-hr. in 1928, an increase of nearly 10 per cent over the output for 1927, according to the U. S. Geological Survey.

Of this amount 34,747,000,000 kw.-hr. was generated by water power, or about 40 per cent of the total output. Water power has generated more than one-third of the electricity produced by public utility power plants every year from 1919 to 1928. During the past four years the output by water power has increased more rapidly than the output by fuel power, and in 1928 the output would have been more than the 40 per cent attained but for the abnormally dry weather in the latter part of the year, which reduced the water supply of the streams used for power.

The amount of electricity generated by the use of fuel was 53,104,000,000 kw.-hr. or 60 per cent of the total. Of this amount, coal was used in the generation of 88 per cent, gas 7 per cent, oil 4 per cent, and wood less than 1 per cent.

Public utility companies and their power plant operators again were successful in increasing the efficiency in the utilization of fuels in the generation of electricity. The amount of electricity generated by the use of fuels in 1928 was 5.5 per cent more than in 1927. The amount of fuel consumed, however, was only 1.1 per cent more than in 1927, and the increase in output, therefore, was five times as much as the increase in the amount of fuel consumed.

The Geological Survey also has issued statistics on the developed water power in the United States on Jan. 1, 1929. On that date the total capacity of water wheels installed in water power plants of 100 hp. or more was 13,571,530 hp., an increase of 1,235,530 hp. or 10.4 per cent during 1928. The increase for 1927 was only 575,000 hp. Of this amount 317,200 hp. was added by the eleven Western states, or 55 per cent of the total increase. Of the 1928 increase the eleven Western States supplied 392,500 hp., or 31 per cent of the total increase.

In this development California ranks first with 16.4 per cent of the total, New York second with 13.3 per cent and North Carolina third with 6 per cent. The figures for the eleven Western states follow:

	Horsepower
California	2,226,529
Oregon	288,973
Washington	747,407
Nevada	13,650
Utah	154,200
Arizona	104,360
New Mexico	1,510
Colorado	98,016
Wyoming	78,355
Idaho	357,577
Montana	393,440

Puget Sound Company to Build Substation at Renton, Wash.—The Puget Sound Power & Light Company, Seattle, will erect a new power substation at Renton, Wash., which will entail an expenditure of $600,000. The station will handle all the transmission lines from the new $5,000,000 Shuffleton steam power plant now under construction on Lake Washington by the company, as well as those from the Snoqualmie Falls, White River and Baker River power plants of the power company. Construction is expected to begin during the summer.

U. S. Suit Involves Rights on San Joaquin River

Millions of dollars and the rights of hundreds of owners of riparian rights along the San Joaquin River are involved in a suit filed March 5 in the United States District Court by the United States Government against the Central Stockholders Corporation of Vallejo and the Southern California Edison Company.

The suit was brought to determine the government's right to control both navigation and flood waters of the San Joaquin River. The action, as filed by Assistant U. S. Attorney Paker and U. S. Attorney McNabb, seeks an injunction to restrain the Central Stockholders' Corporation of Vallejo from proceeding with a suit now on file in the supreme court of Stanislaus County against the Southern California Edison Company. Judge James of the United States District Court issued a temporary restraining order and an order to show cause, returnable on April 9 next. The injunction holds up action by the state courts until that date.

The action, so far as the Southern California Edison Company is concerned, is a friendly one, the government being in accord with the plans of the company to develop the most efficient and beneficial use of the water. This applies to domestic, agricultural and navigation purposes. The Edison company now holds federal licenses to develop the water power from the river and has constructed several reservoirs. The company previously had settled an action brought by the administrator of the Herminghaus estate relating to riparian rights.

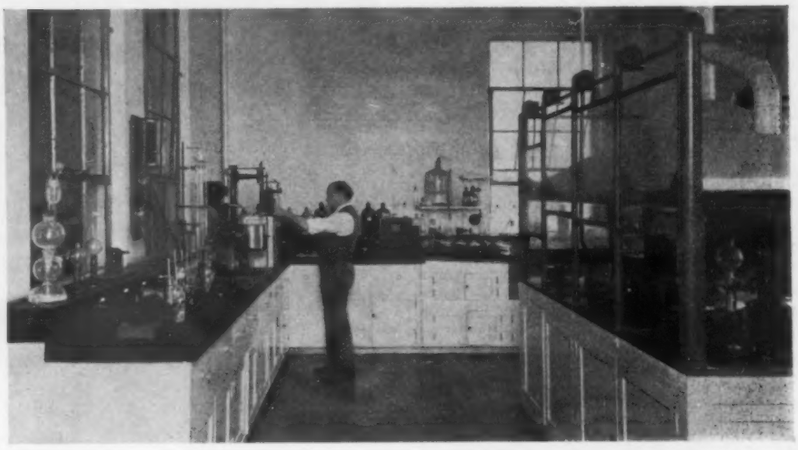
The suit brought by the government is based largely upon its right to develop the navigation facilities of the river, and it is held that the landowners, holding riparian rights covering about 60,000 acres, are interfering with the government's rights by wasteful use of the flood waters.

City Adds to Fund for Dam Disaster Damage Claims

On March 12, the day preceding the first anniversary of the St. Francis Dam disaster, the Los Angeles City Council added to funds already appropriated a $2,000,000 funding bond issue, proceeds of which are to be used in paying damage claims approved by the joint committee. This committee was appointed soon after the disaster and now has been at work nearly a year examining and arbitrating claims. Actual payment was delayed some months by a lawsuit which now has been settled.

A total of 2,828 damage claims of all sorts was filed. About 200 of these have been disallowed by the committee and of the remainder about 90 per cent, representing $3,431,072, have been approved for payment. Many of the largest claims, however, are included in those not yet arbitrated and it is estimated that a total of $7,000,000 may be needed to settle all outstanding claims. This is in addition to the $2,000,000 spent by the city in restoration of the Santa Clara Valley immediately after the disaster.

Testing Laboratory at Long Beach Steam Plant



ONE of the features of the Southern California Edison Company's Long Beach steam plant No. 3 is a completely equipped chemical laboratory which not only carries on the routine tasks of analyzing and testing fuel, water and lubricants, but also does experimental work looking toward further economies in operation. August Sattler is the chemist in charge.

Voters' League Reports on Seattle Light Dept.

The final report on the investigation of the Seattle Light Department being conducted by the Voters' Information League has been submitted to the league's membership. In the report the following "unavoidable conclusions" are presented:

"**First:** On Dec. 31, 1927, bonds were outstanding to the sum of at least $111.67 for each $100 of book value of physical property and plant of the light department. The department's physical property and plant were overloaded by at least 11.67 per cent at the close of 1927, and millions more in bonds have been and are being issued.

"**Second:** For the first years, 1923 to 1927, inclusive, the gross earnings of the department have not been sufficient to take care of operating expenses, maintenance, depreciation, bond interest and redemption and there has been incurred a deficit of more than $1,000,000. The deficit for the year 1923 was $26,698, the deficit for 1925 was $276,242, and the deficit for 1927 was $501,017. These deficits have increased year by year, and must continue to do so as bond interest and bond redemption increase.

"**Third:** The facts and figures of past history show that for each $1 of future gross earnings the department will incur $1.21 in charges for operating expenses, maintenance, depreciation, bond interest and bond redemption, thus incurring an actual deficit of 21 cents on every $1 of annual gross earnings.

"**Fourth:** If the present policies continue, eventually the taxpayers of Seattle will have to pay the operating deficits and assume the burden of the department's bonded debt. In every utility bond issued, the City of Seattle binds itself to establish and maintain rates that will provide sufficient revenues to pay the principal and interest of all bonds authorized by ordinance of the City Council. The Council by ordinance authorizes all utility bond issues. If utility revenue falls short of sufficiency to meet bond requirements, there is no chance to evade the responsibility of providing the money by general taxation."

The report shows that up to Dec. 31, 1927, the light department had invested in property and plants, exclusive of property paid for by improvement districts and exclusive of bond interest, a total of $28,741,586. In the same period bonds were issued to a total of $28,939,000. For the year 1927 the department's gross earnings were $4,361,743, showing that it was necessary to issue $6.63 worth of bonds for every $1 of gross earnings.

Mayor Frank Edwards has announced that he will ask the City Council to pass the necessary legislation that will enable him to appoint an efficiency engineer to study all city departments, giving special attention to the light department. Salary and expenses of such investigator were provided for in the budget of this year.

B.C. Water Shortage Result of Light Rainfall

The rainfall in British Columbia has been phenomenally light since the beginning of the year, with the result that there has been a severe shortage of water in the district. Early in March the British Columbia Electric Railway Company issued a statement pointing out the seriousness of the situation and stating that if the shortage continued it might be necessary to ask the public to curtail the use of light and power.

The rainfall at Lake Coquitlam during January and February of this year was only 5.1 in. as compared with 29.08 in. during the corresponding months of last year and of 37.75 in. during the same months of 1927. On Jan. 30 the power company put its reserve steam plant into operation and it has been running continuously since.

City of Tacoma to Build New Hydro Plant

City officials at Tacoma, Wash., have announced that construction will begin soon on the city's second hydro plant on the Skokomish River. This development is known as Cushman No. 2. The power house will be situated at tidewater on the Hood Canal, an arm of Puget Sound.

Plans include the construction of a constant-angle arch dam 240 ft. high, 450 ft. in length on the crest, and 60 ft. long at the bottom, and a 13,000-ft. tunnel leading from the dam to the bluff above the power house site. Two 20,000-hp. water wheels will be installed in the power plant. They will operate under a static head of 475 ft.

McGraw-Hill Buys Paper to Serve Aviation Field

Purchase of Aviation, the oldest aeronautical magazine in the United States, has been announced by the McGraw-Hill Publishing Company, Inc., New York, through James H. McGraw, chairman of the board. The magazine, which is published weekly, was acquired from the Aviation Publishing Company, of New York. Earl D. Osborn, who has been publisher of the periodical for several years, will join the McGraw-Hill organization and continue his activities in the field of the magazine. The paper covers aircraft manufacturers, engine and parts makers, airport distributors, and all others professionally engaged in aeronautics.

In making the announcement of the purchase of Aviation Mr. McGraw said: "Aviation is now becoming a vital tool of modern business, and a new basic industry is in process of development. McGraw-Hill desires to contribute to the progress of aviation a publishing service that will provide every facility of modern industrial journalism to aid in the solution of its inherent problems."

Lewis River Rights Applied for by Inland Power Co.

Application has been filed with the Federal Power Commission and with the Washington state hydraulics office by the Inland Power & Light Company for permits for a power project on the Lewis River near Portland, Ore., and Vancouver, Woodland and Kalama, respectively, in Cowlitz, Clarke and Skamania Counties, Wash.

The plan calls for a dam about 200 ft. high to be built at the Ariel site about 17 miles above the confluence of the Lewis and Columbia Rivers; a dam about 230 ft. high at the Basket site about 32 miles above the mouth of the Lewis River; a dam about 200 ft. high at the Swift site, about 45 miles above the confluence of the Lewis and Columbia Rivers, together with a tunnel five miles long; and a dam about 150 ft. high at the Muddy Creek site 57 miles above the mouth of the Lewis River, together with a tunnel three miles long. A power house would be built at each dam. Installed capacity of the project is estimated at 233,000 hp.

Centralia, Wash., Votes to Build Power Plant

At a recent special election held in Centralia, Wash., a proposition to issue bonds for construction of a municipal power plant was carried by a large majority. The project is estimated to cost $950,000, of which $650,000 will be covered by the issuance of utility revenue bonds.

Plans provide for a diversion dam on the Nisqually River with a canal 32 ft. wide at the top and 16 ft. at the bottom to carry the water 9½ miles to Yelm, where a power plant of 11,000-hp. capacity will be erected.

Ownership of a hydro-electric plant has been under consideration by Centralia for some time. The city at present is receiving current from the Western Cross Arm & Manufacturing Company for its municipal distributing system under contract which has about ten years to run but contains a provision for its abrogation if the city should have a hydro-electric plant in operation by Oct. 31, 1930. The proposed plant is expected to be in operation by Oct. 1, 1930.

G. C. Sawyer Resigns From Pacific Power & Light

George G. Sawyer, assistant general manager, Pacific Power & Light Company, has resigned from that company to join the Electric Bond & Share Company, New York. He will be placed in charge of the Mexican properties of the American & Foreign Power Company which are managed by the Bond & Share company.

Mr. Sawyer is succeeded as assistant general manager of the Pacific Power & Light Company by Charles M. Sanford.

El Paso Co. Plans New 25,000-Kw. Steam Plant

Construction of a new steam plant is to be begun by the El Paso Electric Company as soon as plans have been completed. It is expected that the work will be finished by December of this year.

The new plant, which with its equipment will cost approximately $4,800,000, will be situated on a 70-acre tract northwest of the city about 1½ miles above Courchesne Bridge. The plant will house a 25,000-kw. turbo-generator and two Stirling boilers, each rated at 1,500 hp. The new station will be interconnected with the company's present plant on South Santa Fe St.

W. R. Putnam Resigns From Idaho Power Company

W. R. Putnam, vice-president and general manager, Idaho Power Company, Boise, has resigned to take up new duties with the Electric Bond & Share Company in New York. He will retain his connection as vice-president and director of the Idaho company. In accepting the resignation the board of directors passed a resolution complimenting Mr. Putnam on his successful management of the company and expressing regret at the loss of so able an executive and of an associate of such high personal qualities.

Mr. Putnam, formerly sales manager of the Utah Power & Light Company, Salt Lake City, joined the Idaho Power Company in May, 1919.

M. L. Hibbard, since April 5, 1928, assistant general manager, has been named to succeed Mr. Putnam as vice-president and general manager. Prior to joining the Idaho company he had been chief operating engineer for the Northern States Power Company at Minneapolis.

B.C. Co. Plans Power Plant on Campbell River

Application has been made by the Vancouver Island Power Company, a subsidiary of the British Columbia Electric Railway Company in Victoria, B. C., for water rights in the Campbell River district. The company asks permission to construct a dam at the outlet of Buttles Lake in the heart of Strathcona Park, which would raise its level to a height not stated and flood 1,800 acres around the margin.

In addition, the application seeks the right to dam both the Campbell Lakes just outside Strathcona Park. On Campbell Lake 3,500 acres of land would be flooded and on Upper Campbell Lake 3,700 acres. Plans include the erection of a power plant of from 85,000 to 90,000 hp. to be situated on the Campbell River about a mile from its mouth.

Colorado River Conference Adjourns to April 17

The tri-state Colorado River conference which has been in session at Albuquerque, N. M., adjourned March 8 at the suggestion of Col. William J. Donovan, chairman of the session. Representatives of the three states involved, Arizona, California and Nevada, will reconvene April 17 at Albuquerque.

In suggesting the recess Colonel Donovan said, "We need a breathing period. Upon the face of the proposals submitted by California and Arizona, it would seem their divergent views cannot be reconciled. But upon analysis I think any fair observer would say that actually these two states are not too far apart to reach a meeting point. However, both must be prepared to have mutual confidence in each other's sense of fairness."

The Colorado River Compact, originally drawn up in Santa Fe, N. M., in 1922, now has been approved by six of the seven Colorado River basin states. On March 4 Governor Young of California, which state previously had ratified the Santa Fe Compact conditionally, signed a measure ratifying a six-state compact, and on March 6 Governor Dern of Utah, which state had withdrawn its original ratification, signed a measure providing for six-state ratification of the compact. The Boulder Canyon Project Act passed by Congress stipulates that the act shall not become effective until the Colorado River Compact shall have been approved by the seven basin states, or if not so approved in six months (from Dec. 21, 1928, the date on which the bill was signed by the President) then approval by six, one of which must be California, shall be sufficient.

City of Vancouver, Wash., Contemplates Municipal Power Plant—The City Council of Vancouver, Wash., has instructed the city attorney to make filings on Lewis River sites as an initial step toward the development of a municipal power plant in Vancouver. Two sites are to be filed upon. A special committee has been appointed to obtain figures on the ultimate cost of a proposed municipal power and light plant.

FINANCIAL NEWS

Puget Sound Company Adds $2,500,000 to Budget

The 1929 budget of the Puget Sound Power & Light Company, Seattle, originally placed at $9,000,000, has been increased by $2,500,000 because the company has decided to install the second 50,000-hp. steam unit in its new Shuffleton plant near Renton, Wash. The plant with one such unit, now well advanced in construction, is to be ready for operation Sept. 1, 1929. The installation of the second unit is to go forward concurrently with the first, and completion of the second unit is scheduled for August, 1930.

Details of the company's original budget were published in Electrical West, Feb. 1, 1929, p. 114.

Rate Equalization Benefits Small Utilities' Consumers

Efforts of the Gas and Electric Division of the California Railroad Commission to bring about an equalization of the light and power rates of the small utilities with those of the larger and more efficiently operaterd power companies in their immediate vicinities, or in the same class of territory, will result beneficially in 1929 to the consumers of small electric utilities throughout the state.

In line with this policy and as a result of negotiations conducted by the commission, electric consumers in Pinole, Rodeo and Hercules in Contra Costa County, served by the Pinole Light & Power Company, will enjoy the same rates as are charged by the Pacific Gas and Electric Company and Great Western Power Company, as will also the consumers of the Bay Point Light & Power Company at Bay Point and Clyde of the same county. Electric consumers in Plumas, Sierra, Placer and Nevada Counties, served by the Sierra Pacific Power Company, also will receive the benefit of the lower rates.

In authorizing R. B. Young to sell the Grizzly Electric Company to the Sierra Pacific Power Company, which also will extend its service to points around Lake Tahoe and the counties already named, the commission prescribed rates which will equalize the charges with those of the larger electric utilities in equivalent territory.

Ruling in Revaluation Case Against Grays Harbor Co.

By decision of the Supreme Court of Washington affirming action of the Thurston County trial court, the Grays Harbor Railway & Light Company, Aberdeen, is denied writ of prohibition to enjoin the Department of Public Works from making an entirely new original valuation of its electric properties.

Prior to 1915 a primary valuation had been made by the department, which was subsequently brought down to June 30, 1915. Upon complaint against the company's light rates in 1927, the department started an entire revaluation of the property, to which the company objected, maintaining that the proper method would be to bring the previously established valuation down to date. The company claimed it would be put to great labor and expense to produce the original data and to obtain necessary witnesses. The high court, however, agrees with Judge John M. Wilson of Thurston County that appellant has an adequate remedy by appeal and that prohibition is not the proper procedure.

To Spend $20,867,000 in Electrical Department

A budget of $20,867,000 has been appropriated by the Pacific Gas and Electric Company for 1929 expenditures in its electrical department. This sum has been apportioned as follows:

Maintenance	$2,049,000
Steam generation	3,544,000
Hydro-electric generation	4,036,000
Transmission	2,033,000
Distribution	5,262,000
General	943,000
New services, meters, etc.	3,000,000

The major items of new construction include a continuance of the Salt Springs hydro-electric development, a three-year program to be completed in 1931 and involving a total expenditure of $25,000,000, and the conversion of the company's steam plant, Station A, in San Francisco, from 63,000-kw. to 225,000-kw. installed capacity. The new plant, which will be built in units, is expected to be completed in five years at a total ultimate cost of $11,000,000.

Booklet Issued by United States Electric Light & Power Shares, Inc.—Under the title, "Twenty-Nine Million Wild Horses," The United States Electric Light & Power Shares, Inc., an investment trust of New York, has issued a booklet listing the names of power companies whose securities it owns. The booklet sets forth that the installed capacity of power plants owned by the companies listed is 29,000,000 hp., and gives various other statistics relative to the companies, such as production, communities served, energy generated and increase in earnings. Other factors which contribute to make the securities of electric light and power companies popular with the investors also are set forth.

Southern California Edison Company to Issue and Sell $2,000,000 Gold Bonds—Permission has been granted by the Railroad Commission to the Southern California Edison Company to issue and sell, at not less than 97.5 per cent of face value, plus accrued interest, on or before Sept. 30, 1929, $2,000,000 of its refunding mortgage gold bonds, series of 5's, due 1952, and to use the proceeds, other than accrued interest, to reimburse its treasury because of suplus earnings used to retire the $10,225,000 of general and refunding mortgage bonds of Aug. 1, 1928, and to finance in part its 1929 construction expenditures.

Pacific Coast Electrical Association

Roy Cowles Named General Convention Chairman

THE general chairman for the forthcoming P.C.E.A. convention to be held at Del Monte, June 19-22, has been appointed with the naming of Roy Cowles, assistant chief of the division of electric distribution and steam engineering, Pacific Gas and Electric Company, for that responsibility.

ROY COWLES

The many years of intensely active participation of Mr. Cowles in the work of the P.C.E.A. and the N.E.L.A. make him peculiarly well qualified for the duties that will fall to him as general chairman. He served as chairman of the underground committee of the Technical Section, P.C.E.A., 1921-1922; as chairman of the safety rules committee 1922-1923; as chairman of the overhead systems committee 1923-1924; as vice-chairman of the Technical Section 1924-1925; and as chairman of that section 1925-1926. For several years past he has been a member of the national overhead and national underground committees, and was a member-at-large of the national engineering executive committee, N.E.L.A., for 1927-1928. He was co-editor of the Overhead Systems Reference Book published by the N.E.L.A. in August, 1927.

Mr. Cowles entered the employ of the Pacific Gas and Electric Company in Oakland in 1910 after graduation from the electrical engineering department of the University of California with the class of that year. By 1921 he had become superintendent of underground distribution and at that time was transferred to his present position in the central office in San Francisco. He is a member of the American Institute of Electrical Engineers and of the Illuminating Engineering Society, and is on the teaching staff of the University of California Extension Division.

Commercial Section Conclave Reveals Much Accomplished During the Year

ELIMINATION of feature speakers and concentration upon a working program did not deprive those attending the conclave of the Commercial Section, P.C.E.A., at Fresno, March 21-22, of much entertainment, including several features which were sprung as a surprise during the course of business. Such features were devised by chairmen of several committees as a means of best demonstrating accomplishment of their committees during the year.

In the absence of J. F. Pollard, section chairman, who was attending the meeting of the National Commercial Section at Chicago, George Bigelow of the Southern Sierras Power Company, vice-president of the section, presided. The first day was taken up in final meetings of the individual committees and in final preparation of papers for the convention issue of Electrical West. The second day was devoted to general sessions at which the individual committees reported to the entire section on what they had accomplished during the year.

H. C. Rice, chairman of the Merchandising Bureau, reported first on a national merchandising meeting at which the water heating survey was again proposed, a national food preservation week on behalf of refrigeration was planned, and activity on oil burner equipment organized. Myron McNeal reported on the plan to ask manufacturers to make up counter cards in which the convenience outlet could be tied in, feature twin convenience outlets on all appliance price tags, abolish the term "lamp socket appliance" and keep the committee acquainted with new lines which might be developed.

Then a radio on the stage was ostensibly tuned in on a special "Jonesey and Mabel" radio hookup and the first program of that series repeated. Actors in the San Joaquin company were later introduced as the cast of this particular broadcast.

Air heating classes and revision of the air heating manual were announced by H. H. Douglas, and O. R. Doerr likewise announced a revised edition of the commercial cooking manual, adding cost data to it. The refrigeration committee was declared defunct. The range committee, according to Ray Turnbull, completed a survey of cities and found that out of 130 California cities 103 had accepted the minimum range wiring specifications, 9 had made reservations, and 17 had not reported, out of which perhaps only 11 would be found not to have accepted the plan. Demand and diversity studies were being made also. For next year he recommended that the committee develop sales campaign plans.

W. E. Carlson, reporting for the Lighting Bureau, described the golden jubilee of the lamp celebration to be held in October. The subject of industrial lighting is to be made clear by a new handbook. The commercial lighting committee has evolved a set of lighting standards to become the companion piece of the Red Seal Plan, setting up a sales standard for installations of this kind. That domestic lighting can be campaigned was demonstrated by Frank Bevan in recounting the sales convention and show held recently by the Pacific Gas and Electric Company. In this the P.C.E.A. tie-in provided a means of showing to the interested organizations of San Francisco what could be done with lighting.

The Red Seal essay contest was declared a success by Ward Schafer, chairman of the General Bureau. A total of over 1,200 essays was entered. The preponderance of interest from one utility, however, was shown to indicate lack of co-operation with the idea by other companies to the detriment of the industry. Next year's essay subject will be on domestic lighting. W. A. Cyr, reporting for the wiring policy committee, defined the difference between sales responsibility and regulation responsibility in considering codes. The committee is to seek to establish the range specification permanently and to inaugurate a range and water heater specification at the next inspectors' convention.

The Power and Heating Bureau report, under chairmanship of P. P. Pine, brought forth the work of this committee as particularly important this year on account of (1) the revision of the industrial power and heating handbook, (2) the compilation of an exhaustive report on oil pipe line heating, (3) the issuance of the agricultural power handbook, and (4) a fact report on competitive costs of Diesel engine power. The latter provoked spirited discussion.

At the executive committee meeting the plans for the section's participation at the annual convention were discussed and decided upon. Roy Cowles, general convention chairman, was present to discuss the matter.

Engineering Section Will Meet in Fresno

Closing the activities for the year 1928-29, the Engineering Section will meet in the San Joaquin Power Building, Fresno, Calif., April 17-19.

At these sessions plans will be laid for participation in the program of the forthcoming annual convention of the association, reports will be heard from delegates to the Eastern group meetings and next year's work will be outlined.

Northwest Electric Light & Power Association

Northwest Convention Plans Rapidly Take Shape

Plans for the twenty-second annual convention of the Northwest Electric Light & Power Association in Seattle, June 26-29, 1929, are rapidly taking shape, according to C. R. Wallis, General Electric Company, Seattle, who has been appointed general convention chairman. Subcommittees are at work on different phases of convention activities, and something novel by way of entertainment, as well as interesting programs at the sessions, is promised.

Following are the chairmen of the subcommittees: program—M. T. Crawford, Puget Sound Power & Light Company; entertainment—J. H. Kelly, Graybar Electric Company; golf—E. L. Crider, Puget Sound Power & Light Company; golf handicap—G. E. Quinan, Puget Sound Power and Light Company; finance—F. W. Brownell, Puget Sound Power & Light Company; hotel—A. J. Lutz, Pacific States Electric Company; publicity—P. R. Miller, Westinghouse Electric & Manufacturing Company; registration and information—J. J. Hayes, Westinghouse Electric & Manufacturing Company; and transportation—W. H. Somers, Puget Sound Power & Light Company.

Rural Load Building Is Major Topic at Midwinter Commercial Conclave

RURAL electrification, from the point of volume of material presented, formed the principal subject of discussion at the fourth annual midwinter conference of the Commercial Section of the Northwest Electric Light & Power Association at Spokane, Feb. 28-March 2, 1929, with more than 100 commercial men in attendance.

The foundation for the conference was laid in talks by J. E. E. Royer, assistant general manager, and Lewis A. Lewis, sales manager, The Washington Water Power Company, Spokane, the latter chairman of the section, and M. L. Hibbard, assistant general manager, Idaho Power Company, Boise, responding as vice-president of the association. These talks stressed the necessity for intensive commercial effort and the value of such conferences. Committee reports and discussions on them were grouped into programs presented by the Power, Merchandising and Lighting Bureaus, respectively, with the bureau chairmen presiding.

Power Bureau

With E. E. Scofield of The Washington Water Power Company, Spokane, chairman of the Power Bureau, in the chair, the report of the commercial cooking committee was presented by C. J. Anderson, Edison Electric Appliance Company, Portland, giving statistics on the saturation in commercial cooking and baking in the Northwest territory, which showed that out of 1,448 ovens in Oregon and Washington 413 were electric, while only 167 out of approximately 10,000 public eating places were cooking electrically. The amount spent annually for gas, oil, wood and coal by bakeries and restaurants in the Northwest was given as $8,819,250, represent the total approximate revenue possibility for Northwest power companies at the present time from this class of load. Kitchen supply companies were said to be the most potent selling agencies with which to co-operate in securing a larger percentage of this kind of load.

In the discussion which followed the high price of electric equipment was cited as a deterrent to securing more of this business, which the manufacturers explained as being due to lack of volume and to the spending of manufacturers' profits on pioneering. The long life of the equipment, it was shown, acts as an offset to the greater price. It was pointed out that before this business could be taken on in the smaller communities power companies should make certain of their ability to deliver a service that would be practically continuous.

The report of the industrial heating committee, presented by Carl Hoffman, The Washington Water Power Company, Spokane, placed the potential market for this type of load at 100 per cent of the present motor load, including isolated plants, called attention to the 100 per cent power factor of the load, stressed the necessity of demonstrating by trial installations as a selling method, and set the maximum rate at 1½ cents per kw.-hr. to compete with other fuels, taking into consideration the over-all efficiency of electric heat.

Among specific applications described in the discussion were stereotype metal melting in a Spokane printing plant, where a total load of 120 kw. is on three hours a day and part of this load is used nine hours; office heating in wood-working plants where high insurance rates prevail when other types of fuel are used; and an installation in the Portland territory where paper in process of manufacture is heated as it goes over the rolls. It was brought out that a specialized engineering knowledge and a knowledge of processes in manufacturing was necessary to the salesman of heat for industry.

Reporting informally for the power committee, E. E. Scofield stated that the final report would discuss Diesel and steam competition, electric-driven irrigation plants and pre-cooling plants, and the qualifications of power salesmen. The maximum rate at which electric power could compete with Diesel engines in this territory was placed at 1½ cents per kw-hr. Diesel competition featured the discussion, it being pointed out that the lack of accurate data on Diesel operation presented the principal difficulty encountered in this competition. Several sources of such data were named and the committee agreed to act as a clearinghouse for information on the subject.

Merchandising Bureau

The consolidated experience of several companies in range merchandising was presented by G. A. Kumler, Portland Electric Power Company, Portland, reporting for the domestic range committee. Among the points brought out were that trade-ins presented a serious problem that had been solved fairly satisfactorily in some companies; that down payments should be 10 per cent except in campaigns where a smaller one might be warranted as a stimulus to buy; that the giving of premiums was not good policy; that co-operation with furniture dealers that sold ranges had proved productive in some localities; that in many communities the cream had been skimmed off the prospect list and it would be necessary to find ways of making ranges available to the wage earner with a comparatively small income; and that twelve months of activity with ample man-power was more productive than selling by spasmodic campaigns.

Extended discussion touched on practically all the above points, and included an explanation of the plan for handling trade-ins developed by The Washington Water Power Company which had a working arrangement with a second-hand dealer by which former losses on trade-ins had been turned into a small profit. Plans for extending terms to meet the conditions found among customers with smaller incomes were discussed and indicated that a safe term policy might be worked out to bring such customers safely into the field of live prospects.

Discussing refrigeration from the standpoint of the desirability of the load, and, secondly, the methods found practicable in developing the load, the report of the domestic refrigeration committee as presented by Glenn L. Jackson, Mountain States Power Company, Albany, Ore., indicated that the load was desirable and that refrigerators were being merchandised by some though not all the companies. For those companies desiring to build the load in part through their own selling organizations the report recommended that specialized salesmen be employed to sell the year round; that advertising and demonstration be directed toward education of the public; that definite trade names of refrigerators be advertised; that the company maintain close co-operation with competitive dealers; and that terms be extended sometimes as long as 40 months, to compete with the automobile, piano, radio, phonograph, furniture, oil furnace and other similar home equipment. Discussion indicated that some companies preferred to leave the distribution of refrigerators to manufacturers' representatives or their agents who had built up large specialized sales staffs and were doing a good job.

Through the consolidation of fifteen

replies to 38 questions asked by the water heating committee, the most comprehensive statistics on the status of the water heating business in the Northwest yet to be assembled were made available in the report of that committee, as presented by J. W. Wisdom, Jr., Northwestern Electric Company, Portland. The questions pertained to the number of flat-rate and metered heaters, wattage, consumptions, conditions of service, rates, manner of installation, effect on system peaks, types of heaters and other general headings. Little attempt was made to draw conclusions of any great moment, but the committee pointed to this important committee function as a possibility for next year's committee after further fact finding and study.

In the discussion, **M. L. Hibbard, Idaho Power Company, Boise, was asked to explain** his company's recently-formulated policy on improving its water heater service to its customers (ELECTRICAL WEST, March 1, 1929, p. 137). R. M. Bleak, Utah Power & Light Company, Salt Lake City, also told of the step recently taken by his company in merchandising water heating service, adopting as a standard installation the two-heater, single thermostat, one-third tank continuous system (metered) which is essentially that described in Mr. Hibbard's article mentioned above as the duplex, semi-automatic. Further discussion tended to point to maintaining lower temperatures as preferable in hard-water territories, to minimize scale formation, corrosion, and radiation, such temperatures being from 140 to 160 deg. F.

The major conclusion of the report of the general merchandising committee, presented by H. W. Cooper, Pacific Power & Light Company, Lewiston, Idaho, which took up the question of sales organization, was that sales effort should be as intensive as good business will permit, and that a sales organization be built up to sell as large a quota of major appliances as the territory can absorb annually; rather than that quotas should be limited to the selling capabilities of an existing sales force.

As a supplement to the report V. H. Moon, Pacific Power & Light Company, Portland, chairman of the Merchandising Bureau, was asked to explain the plan by which his company expects to sell $1,000,000 in electrical merchandise in its territory this year, being equal approximately to $24 per customer. Discussion centered around plans for gaining general employee co-operation, and on executive support.

Promotional Rates

Defining a promotional rate as one designed to induce the customer to use to a maximum the facilities required to serve him, the report of the promotional rate committee, by Thomas M. Gibbes, Puget Sound Power & Light Company, Seattle, found that the greatest effect on increasing consumption and revenue was derived from a reduction in the price of the second step, with the greatest differential between the first and second steps; that the next effective influence was derived from a decrease in the sum produced by the first step; and that lowering the price of the first step had the least influence. Discussion called attention to the bad psychology of the readiness-to-serve charge, and centered on a consideration of room rates plus comparatively low kw.-hr. charges.

Lighting Bureau

The report of the electrical advertising committee, presented by T. W. Fitch, Portland Electric Power Company, Portland, discussed the possible field in sign, billboard, window and flood lighting, stating that 100 per cent increase might be expected in view of the resurrected interest following the depression into which this load had sunk during the war. The Neon sign was said to dominate the sign field in the West, and its low power factor as well as its effectiveness from the customer's standpoint could be improved by combining incandescent lighting with it. Second story windows in cities are presenting a comparatively new and important field in window lighting and require generally higher intensities for effectiveness than do ground floor windows. Flood lighting of buildings and billboard lighting also constitute productive fields. Methods of selling were likewise discussed and the necessity of co-operating with sign manufacturers was stressed. Discussion was largely on correcting of power factor on Neon signs by capacitors, it being shown that when the sign was put out by the sign company on lease a slight increase in rental would take care of the additional investment in capacitors.

Reporting for the home educational committee, Fred Zaugg, Northwestern Electric Company, Portland, chairman of the Lighting Bureau, outlined the talk with illustration and demonstration that the committee was presenting this year to parent-teacher associations. This was shown to be a continuation of a program of general education on lighting begun two years ago with schools for dealers and continued last year with talks to business men.

Organization of lighting departments and means of developing lighting load were the main subjects of study disclosed in the report of the commercial and industrial lighting committee, presented by L. B. Gowan, Utah Power & Light Company, Salt Lake City. A lighting department with one trained specialist was recommended for each company serving a city of 20,000 population. In some localities, as at Salt Lake City, the development of the business is handled by a bureau composed of power company men and contractors.

It was pointed out that there is need for an industrial lighting campaign in the Northwest territory, but there is no such thing as a season for campaigning which should be carried on all the year round. Trial installations with before and after photographs are effective in selling. The architect is often the key man in the situation where a new building is the prospect, and effort should be made to acquaint the architects of the community with the engineering facilities of the power company lighting department. In discussion, the safety feature of adequate lighting in industry was cited as a most potent selling argument. The high revenue yield per kw. was brought out, which, coupled with the low investment cost to serve the business, was advanced as a reason why companies could afford to spend some money in new business expense to get commercial lighting load.

Presenting the third year's report of a three-year program of the street and highway lighting committee, George M. Boyd, Westinghouse Electric & Manufacturing Company, Seattle, discussed methods of selling street lighting, taking up the three elements to every sale, the salesman, the customer and the product to be sold.

Applying these elements to the case at hand: the power company should supplant the manufacturer as the salesman because of the progressive results in additional commercial lighting which invariably follow a street lighting improvement; the property owner is the customer even though the sale must be made often through his agent, the city council; the article being sold is light, not the equipment by which light is produced. Six specific recommendations as to ownership, installation and maintenance of equipment, and standards of illumination were made, around which centered most of the discussion which questioned the degree as to which the power company should be openly active in solicitation, whether maintenance should be included in the contract, and whether the power company should reliquish installation if it is to maintain the equipment.

Rural Electrification

The program of the rural electrification committee, with J. C. Scott, Puget Sound Power & Light Company, Seattle, presiding as chairman, took the form of a symposium on how farm load could and should be developed. The subject opened with the report of the farm equipment subcommittee of the Merchandising Bureau, by J. C. Baldridge, Idaho Power Company, Boise, who called attention to the need for equipment designed for electric drive. In outlining the farm pdoblem, J. C. Scott stated that the farmer could expect relief from three sources: tariff, marketing, and cutting the cost of production, in the last of which electricity would play an important part. He cited the Kent Poultry Farm, Kent, Wash., which, on applying electricity to incubating, brooding and caring for chicks pending sale, cut its operating costs by one-third to one-half.

In the symposium which followed some phases of the following subjects were brought out in short prepared discussions by those mentioned:

Selling to the Farmer, George Hibbert, Pacific Power & Light Company, Toppenish, Wash.; L. R. Elder, General Electric Company, Portland; C. V. Aspinwall, Westinghouse Electric & Manufacturing Company, Spokane; H. C. Wells, Mountain States Power Company, Albany; and F. H. Robinson, Northwestern Electric Company, Vancouver, Wash. *Co-operation With Dealers,* W. M. Hamilton, Portland Electric Power Company, Salem, Ore; T. E. Holsey, The Washington Water Power Company, Okanogan, Wash. *Equipment and Demonstration,* E. R. Owen, Utah Power & Light Company, Logan, Utah; and H. G. Kelsey, Grays Harbor Railway & Light Company, Aberdeen, Wash. *Farm Specialists and Organization of a Rural Department,* J. F. Farquhar, The Washington Water Power Company, Spokane. *Advertising and Literature,* R. W. Clark, Puget Sound Power & Light Company, Seattle.

Out of the many points raised in these discussions the following few were among the more improtant: that jobbers of farm equipment should be sold on electric drive instead of gas; that the utility representative is the best agency through which to sell electric farm equipment; that manufacturers must offer complete equipment instead of parts to be assembled; that the utility company should act as a colleague of the dealer, not as a competitor, and should assume the largest

part of the burden of overcoming trouble with the farmer's electrical equipment; that often the right kind of a dealer can be made into an effective selling agent; that only quality merchandise should be sold; that the utility farm specialist should be farm-wise, sales-wise and company-wise, and may be recruited from the agricultural colleges or from the utility organization; that farm literature is best placed in the hands of farmers at agricultural fairs or at home by company representatives; and that farm journals form an excellent medium for advertising and news stories illustrative of farm uses.

One session was devoted to the subject, "Developing an Appreciation of the Value of Electric Service on the Farm," from various viewpoints, that of the power company being presented by A. C. McMicken, Portland Electric Power Company, Portland, who stated that the problem was to develop enough uses profitable to the farmer that would allow him to pay a sufficient revenue to the power company to warrant the added investment per customer caused by the low density of customers. Rural service departments of power companies were alleged to be the best agencies for carrying on this development.

Sketching the history of the changes in political and social beliefs which have led to our precent concepts, Dr. E. O. Holland, president, Washington State College, Pullman, plead for a broader understanding by business men of their economic importance in our present complex, mechanistic civilization. The new concept of education, he said, contemplated that not only the lawyer, doctor, teacher, and preacher, but also everyone in every walk of life might aspire to leadership, and that this constituted our present-day "social insurance."

The viewpoint of the agricultural editor was expressed by Fred W. Clemens, assistant editor, The Washington-Oregon-Idaho Farmer, Spokane, trilogy of farm magazines, who asserted that the farm electrification program could not succeed unless those promoting it realized that it must be made profitable to the farmer. He cautioned his hearers to recognize whatever limitations electricity had in meeting the farmer's requirements and to see that only proved uses be pushed.

All Committees of Accounting Section Report at Annual Conference

MONEY saving systems in billing customers, a mode of presenting fundamental statistics to the management graphically, and the importance of fixed capital records in arranging fire insurance schedules were among the subjects raised in the committee reports presented at the fourth annual general conference of the Accounting Section held at Portland March 18, 1929. The meeting was presided over by A. E. Janssen, Idaho Power Company, chairman of the section.

R. M. Boykin, president of the association, in opening the meeting, cited many ways in which the accounting department could assist in building good public relations, could foster commercial development, and could render aid to the busy executive by interpreting the financial history of the business from the standpoint of its economic significance. M. J. Wilkinson, vice-chairman of the section, in responding, urged the section to consider itself a service department for the member companies, for the other sections, and for the utility customers.

F. W. Brownell, Puget Sound Power & Light Company, at the afternoon session outlined the scope of the section activities as including besides co-operation with the national committees, the making of itself a service organization for the Northwest member company executives. This, he said, should be accomplished by attacking problems outside the realm of pure accountancy, problems of a broader economic significance, which would produce facts and interpretations of facts that would be valuable to the directing heads of the companies.

A summary of committee reports and discussions follows:

Customers' Records

Bi-monthly billing of residential customers was discussed in a paper by N. B. Whittier, Portland Electric Power Company. Savings estimated by companies using the system were placed at from 50 cents to $1 per customer per year, and the general conclusion of the report was that such savings more than offset the several intangible disadvantages inherent in the system. The effect on bad debts, and the restriction of working capital through deferred revenue were taken up in the discussion.

Under the heading of wrinkles in customer billing, C. R. Johnson, Northwestern Electric Company, told of the system employed in his company and others of billing only even consumptions, thus making possible the reduction of billing charts by one-half since only the even consumptions need be listed. In machine billing this system is effected by recording all odd meter readings as even, as for instance a reading of "357" is recorded as "358," so that the subtractions will leave an even consumption to be billed. Exceptions where the exact meter reading is used are minimum—fractional-month or final billings.

In a study of public utility credit policies, two systems were considered in a paper by F. L. Nagel, Northwestern Electric Company, namely, "Courtesy Cards" and "Interchange of Credit Information." The advantages and limitations of each were set forth, and the report found that the latter was the more desirable of the two.

Statistics

As part of the program of the statistics committee, Prof. Blair Stewart of Reed College, Portland, outlined a plan he had of producing a business barometer for the Northwest based in part on the accumulation of statistics on the use of electrical energy in basic and secondary industries. Contending that such statistics gathered nationally or from the eleven Western states did not represent accurately conditions in the Northwest, he told of his intention to set up indices applicable to Oregon, Washington and Idaho which would point out the trend of business prosperity for this region and make possible a comparison with the national or Western conditions.

The report of the statistics committee outlined a mode of presenting monthly statistical data to the utility operating manager. A series of six reports containing ten charts covering revenue, expenses, stores, kw.-hr., unit costs and budget data was shown as representing all the data most needed by the executive, and with superfluous material eliminated. Discussion drew forth argument as to the accuracy with which some of the data included in the model reports would reflect the condition of the business and the general conditions in the territory.

General Records

A study of methods of purchasing gasoline and oil among member companies in the Northwest by the general records committee, as reported by O. W. Bennett, Puget Sound Power & Light Company, elicited a wide variety of practice and opinion. No conclusions were reached in the report which was confined to quoting the replies received.

Fixed Capital

On assignment from the national fixed capital committee, the Northwest committee had prepared a report on the practical application of fixed capital records for fire insurance, which was briefed for the meeting by L. E. Hinman. The report tended to show the necessity of keeping accurate watch of fire insurance policies to see that insurable properties are adequately covered, and listed five steps in fire insurance routine that are necessary if adequate recovery of losses is to be assured, determination of insurable property, calculation of the amount of coverage, placement of policies, submission of claim in case of loss, and settlement of claim. Since settlement of loss is based on the present reproduction cost new, less accrued straight line depreciation modified by maintenance, replacement or improvement, and since the "reduced rate average clause" makes necessary an accurate determination of the present insurable value, the importance of keeping adequate fixed-capital records becomes apparent. The report suggested forms for keeping a record of all calculations involved in obtaining present insurance values. Discussion centered around the unfairness of using straight line depreciation as a factor in settlement of claims.

Classification of Accounts

No formal report by the classification of accounts committee would be forthcoming this year, as reported by its chairman, W. F. Miller, The Washington Water Power Company, who raised the question as to whether or not the time had arrived to seek adoption by the various states of the uniform report form recommended by the N.E.L.A. and the National Association of Railway and Utility Commissioners. Such adoption was favored by many of the larger companies which operate in more than one state.

Purchasing and Storeroom

Classification of materials and supplies, storeroom statistics and reconcilement of stores record with control accounts were the subjects discussed in the report of the purchasing and storeroom committee presented by R. H. Jones, Utah Power & Light Company. A convenient classification was said to be construction and maintenance material, merchandise and jobbing supplies, fuel, and general or miscellaneous. A method of reconciling the stores records in the field with the general office control accounts for material and supplies was outlined.

Women's Committee Meets at Walla Walla

Members of the women's committee, Northwest Electric Light and Power Association, were guests of the Pacific Power & Light Company at the committee's midwinter meeting held recently in Walla Walla.

Representatives who attended included: Mrs. Nell Laws, chairman, Puget Sound Power & Light Company, Seattle; Miss Marguerite Butler, Portland Electric Power Company, Portland; Miss Mary Walsh, The Washington Water Power Company, Spokane; Miss Estella Dorgan, Mountain States Power Company, Albany; Mrs. Irma Thiessen, Eastern Oregon Light & Power Company, LaGrande; Miss Martha O. Goldapp, General Electric Company, Portland; Miss Esther Miller, Grays Harbor Railway & Light Company, Aberdeen; and Mrs. Amy Villa, secretary of the Idaho Power Company's women's committee, substituting for Mrs. Gertrude McDevitt, chairman, who was unable to attend.

Miss Thelma Kelly,. local chairman, proved a charming hostess, and at the opening session introduced R. B. Bragg, resident manager, Pacific Power & Light Company, who welcomed the group and encouraged it in its work.

An important result of this meeting was the announcement of an essay contest on the subject, "Pleasing Mr. and Mrs. Public." This contest is being sponsored jointly by the women's committee and the conmmittee on employees' relations with the public.

Meetings

Coming Events

American Institute of Electrical Engineers—Annual Pacific Coast convention in Los Angeles, Sept. 3-6, 1929.

Arizona Utilities Association—Annual convention at El Conquistador Hotel, Tucson, April 4-6, 1929.

Association of Electragists, International—Annual convention in Swampscott, Mass., Sept. 30-Oct. 4, 1929.

International Association of Electrical Inspectors, Northwest Section (formerly Northwest Association of Electrical Inspectors)—Annual convention in Vancouver, B. C., Sept. 9-11, 1929.

Southwestern Section (formerly California Association of Electrical Inspectors)—Annual convention in Sacramento, Calif., Sept. 18-20, 1929.

National Electric Light Association—Fifty-second annual convention in Atlantic City, N. J., June 3-7, 1929.

National Electrical Manufacturers Association—Spring meeting at The Homestead, Hot Springs, Va., May 20-25, 1929.

Northwest Association of Electrical Inspectors—Annual convention and exhibition at Vancouver Hotel, Vancouver, B. C., Sept. 9-11, 1929.

Northwest Electric Light and Power Association—Annual convention at Olympic Hotel, Seattle, Wash., June 26-29, 1929.

Oregon Electragists—Meeting in Eugene, Ore., June 10-11, 1929.

Pacific Coast Electrical Association—Annual convention at Hotel Del Monte, Del Monte, Calif., June 19-22, 1929.

Engineering Section Conclave: In San Joaquin Power Building, Fresno, April 17-19, 1929.

Radio Trade Show—In Civic Auditorium, San Francisco, Aug. 17-24, 1929.

Frigidaire Holds Regional Meeting in San Francisco

With approximately 800 members of the sales organization from the Los Angeles, San Francisco, Oakland, Seattle and Portland districts in attendance, the Frigidaire Sales Corporation held a highly successful Pacific Coast regional sales convention at the Civic Auditorium, San Francisco, on March 15. The convention was conducted by officials from the Frigidaire headquarters in Dayton, Ohio.

R. F. Callaway, vice-president and assistant general manager of the company, reported that 1928 Frigidaire sales in the Pacific Coast territory were 30 per cent higher than 1927 sales. He stated that the national quota for the company for 1929 represented a 25 per cent increase in dollar volume which, with price reduction announced in December, represents a 59 per cent increase in compressor volume. Sales on the Pacific Coast to date for 1929 have shown a 70 per cent increase over 1928, he reported.

Details of some of the convention features will be found on other pages of this issue. Included among the officials from Dayton, who participated in the program, were the following: L. S. Keilholtz, chief engineer; H. H. Kennedy, zone manager; T. B. Fordham, factory manager; E. D. Doty, advertising manager; J. J. Nance of the sales promotion department; C. E. Quigley, zone manager; R. L. Lee, sales promotion manager; Miss V. L. Miller, home service department; Al Harrison, zone manager; J. E. Houser, manager of the test department and H. S. Lehman, manager of the service department.

Engineers of Ogden Form Good Fellowship Club

Having as its object the promotion of good fellowship and service, both to the engineering profession and to the public, final organization of the Ogden Engineers' Club was accomplished on March 12 in Ogden, Utah. The gathering included a large number of men associated with engineering and construction activities in that city and nearby points.

By-laws and constitution were adopted, and the following officers elected: president—J. H. Young; vice-president—J. R. Jarvis; secretary and treasurer—B. J. Truscott; assistant secretary and treasurer—J. C. Littlefield. With the exception of the latter, the officers named, together with B. E. Matteson, J. J. Craven, C. W. Cross and F. M. Earl, form the board of directors.

The new club is a purely local body. The present Ogden chapter of the American Association of Engineers will continue to function, but as a separate organization.

W.W.P. Co. District Agents Study Farm Problems

Thirty-five district and local agents of The Washington Water Power Company attended a three-day rural electric short course at the Washington State College, Pullman, March 4-6, and studied at first hand the application of electricity to farm and farm home problems. The course was held under the supervision of E. C. Johnson, dean of the college of agriculture of the Washington State College, assisted by L. J. Smith, professor of agricultural engineering, and Harry S. Garver, investigator for the Washington Committee on the Relation of Electricity to Agriculture.

At the annual agents' conference on March 6, R. J. Vogler, Omak district agent for the company, was the winner of the annual agents' public speaking contest. Mr. Vogler won the $100 prize and the right to compete in the public speaking contest to be held at the annual convention of the Northwest Electric Light and Power Association in Seattle in June. C. E. Beckwith, Pullman, winner of last year's contest, rated second in the Pullman contest; J. B. Johnson, Sprague, was third, and T. E. Holsey, Okanogan, fourth.

S. F. Electrical League Installs New President

Following its annual election, the San Francisco Electrical Development League has entered upon the work of its new year under the guidance of its new president, Don C. Ray, assistant to the vice-president, Pacific Gas and Electric Company, in charge of public relations and sales. R. N. Phelan, secretary-treasurer, McGraw-Hill Company of California, was re-elected secretary-treasurer of the league. Directors elected to serve for two years include Guy A. Barker, Johns-Manville Corporation; Allyn G. Smith, Pacific Telephone and Telegraph Company; and Robert A. Hudson, Hunter & Hudson, Consulting Engineers. The directors who still have one year to serve are Lloyd Flatland, Globe Electric Works; Ernest Ingold, Ernest Ingold, Inc.; and Benjamin M. Tassie, Manning, Bowman & Company.

A mock inaugural ceremony was one of the features of the installation program.

G.E. Refrigerator Dealers Convene in Salt Lake

More than 100 General Electric refrigerator dealers gathered at the Newhouse Hotel in Salt Lake City on March 11 at a convention of representatives from Uath, Idaho, Wyoming and Nevada.

W. J. Daily, sales promotion manager of the General Electric Company, was one of the principal speakers. Mr. Daily explained the advantages of the 1929 model all-steel refrigerator which the company is now placing on the market and presented many valuable ideas and suggestions for the benefit of the salesmen. Frank Edwards, president of the Frank Edwards Company, Intermountain distributors of the General Electric refrigerator, delivered the address of welcome.

Utah to Hold Statewide Electrical Meeting—April 9 has been fixed as the date and Salt Lake City as the place for Utah's annual statewide electrical meeting. Plans have not yet been completed but it is announced that C. E. Skinner, assistant director of engineering, Westinghouse Electric & Manufacturing Company, East Pittsburgh, will discuss the subject, "Engineering in Modern Business." There will also be a personal explanation and demonstration of "Televox," the Westinghouse mechanical man.

G. E. Official Honor Guest at Luncheon—Judge C. W. Appleton, of New York, vice-president of the General Electric Company, during a visit to Salt Lake City recently was guest of honor at a luncheon given by B. C. J. Wheatlake, manager of the company's Salt Lake branch.

Contractors, Dealers and Inspectors

Inspectors Change Name of Organization

Action of the executive committee of the California Association of Electrical Inspectors, in a recent letter ballot, resulted in the change of the name of the association to the Southwestern Section, International Association of Electrical Inspectors. The change from the "California Section" to the "Southwestern Section" was made at the request of the International Association and enlarges the territory and jurisdiction of the section.

At the same time the dates were set for the annual convention to be held in Sacramento. Sept. 18, 19 and 20 were named as the dates for the 1929 meeting, after it was determined that the Northwest Section, which will meet in Vancouver, is to have its convention Sept. 9, 10 and 11. A number of Eastern leaders and officials of the A. E. I. are planning attendance and for this reason the two conventions were set close enough together to allow attendance at both meetings on the same trip.

Claude Mitchell, secretary of the Southwestern Section, has promises from several notable leaders in inspection activities that they will attend the Southwestern Section meeting at Sacramento. Carl Beaton, president of the Section, is planning for the entertainment of the delegates during the convention.

Article IX to Be Revised by Committee

REPORTING that Article IX, relative to grounding, had been resubmitted to committees for consideration, Claude Mitchell, electrical engineer, Board of Fire Underwriters of the Pacific, San Francisco, and representative from California to the Electrical Committee, N.F.P.A., brought back tidings of the work of that committee which recently met in New York City.

With practically full attendance, the Electrical Committee concluded the agenda for its regularly called annual meeting on the afternoon of Tuesday, February 19. In addition to routine business various minor amendments to Articles, IV, V, VI, XIII and XXXVII were approved.

The entire matter of grounding, including Article IX of the National Electrical Code, was held over on a resolution proposed by W. H. Blood, Jr., representing the N.E.L.A. and unanimously adopted. This resolution calls for laying over Article IX on the table and the appointment of a correlating committee consisting of the chairmen of the Article Committees, all members of the Article IX Committee, together with the chairman of the Electrical Committee and the electrical field engineer, ex-officio, to act as chairman and secretary, respectively, of this correlating committee. The resolution further provided that this committee be instructed to formulate Article IX and any conflicting articles for the code, using in principle the 1925 code and supplementing it with any such additions and revisions taken from the 1928 code and articles in its 1929 reprints numbered 901, 902, 903, 906, and 907, as the correlating committee by unanimous vote of those present shall determine as necessary or desirable or non-controversial. The correlating committee was given power to act for the Electrical Committee in this matter.

Mr. Mitchell declared that the correlating committee is expected to meet in New York City on or about March 25.

Article IX proved to be the bone of contention in the recent controversies regarding the National Electrical Code.

Field Man Appointed for Northern Electragists

APPOINTMENT of a field representative for the California Electragists, Northern Division, to serve the territory around Sacramento and Stockton and the Sacramento Valley was made by President Ed Martin recently.

Fred L. Church resigned from the Commercial Engineering Department of the Pacific Telephone and Telegraph Company to accept the field job for the contractors organization.

Mr. Church's experience in many directions fits him for the work he is to do. He was born in Chicago in 1898 and received his high schooling in that city. He spent two years at Harvard studying engineering and economics. Following this he taught school for one year at a private school for boys in Maine. Later he became instructor of agents for a large insurance company in Chicago and was sent to the Pacific Northwest where he was active in sales work with this company for five years. For the past year he has been with the telephone company in its commercial engineering department.

Fred L. Church, new field representative for the Electragists in the Sacramento and Stockton districts.

With his headquarters in Sacramento, Mr. Church will spend his time in organizing and contact work with the electrical contractors and dealers in the northern San Joaquin Valley and Sacramento districts.

Preliminary to his taking up duties in the Sacramento district he has been making a tour of the territory with George Eldridge, field representative for the northern California territory. Mr. Eldridge relinquishes a portion of territory formerly covered by him to Mr. Church in order to give more intensive service to the remaining northern California territory under his jurisdiction.

The Motor Section of the **Southern Division** at its meeting in February elected the following officers for the ensuing year: President—Frank Broiles; secretary—L. T. Woods; executive committee—A. W. Wotkyns, F. T. Broiles, L. A. Ellett, L. T. Woods, and C. T. Smallcomb.

Silver State Electric Company of Denver was awarded the contract recently for an addition to the church at East Colfax and Columbine. Working together with the Electrical League of Colorado staff, the Silver State Company added 36 outlets to the original layout.

R. H. McCormick, Electragist of Pasadena, Calif., recently finished the wiring of the First Trust Building, Pasadena, a limit-height, earthquake-proof building, the first of its kind in the city. A large main switchboard provides capacity for 800-amp. lighting load and is equipped with two circuit breakers. Burglar alarm system, X-ray panels, interphones and other electrical features run the total wiring over $31,000. Mr. McCormick also furnished all commercial fixtures and handled the wiring and fixtures for the stores and garage in connection with the building.

D. D. Crane, electrical contractor at Elsinore, Calif., in addition to contracting, civil engineering, electrical engineering, and miscellaneous civic work, has recently become editor of the town newspaper, "The Elsinore Leader-Press."

John DeWild, formerly in business in Pasadena as the **DeWild Radio Laboratory,** recently opened a new store at Vista, San Diego County. The store is known as **The Radio Electric Company** and is attractively arranged for the sale and display of radio and electrical appliances. House-wiring and contracting are also done in this growing community by Mr. DeWild.

Southern Estimators Name Officers and Committees

OFFICERS and committees for 1929 were appointed recently by the Estimators Section, Los Angeles, at the annual meeting. J. R. Wilson, Quality Electric Works, regular contributor to Electrical West's contractor section, and for three or four years secretary of the Estimators Section, was named president to succeed W. H. Hyde, president for the past two years.

Following is a list of the new officers of the section and committee appointments:

Officers of Section: president—J. R. Wilson; vice-president—C. J. Bennett; treasurer—M. L. Fish; secretary—P. A. Shrader.
Executive Commitee: W. L. Hyde, L. H. Ellett, R. L. Booth, P. R. Mactolff.

COMMITTEES

Architects and Engineers: R. L. Booth, chairman; W. L. Hyde, vice-chairman; C. J. Bennett, G. B. Capps.
Data: P. A. Shrader, chairman; L. H. Ellett, vice-chairman; F. S. Drake, P. R. Mactolff, J. W. Rose, W. L. Robar, M. Scott, Scott Miller, R. L. Ristow.
School: P. A. Shrader, chairman; R. J. Hanchett, vice-chairman; W. L. Hyde, Art Ogilvie.
Ordinance: L. H. Ellett, chairman; C. J. Bennett, vice-chairman; R. J. Hanchett, Art Ogilvie.
Editorial: J. R. Wilson, chairman; J. W. Rose, vice-chairman; R. J. Hanchett, P. R. Mactolff, W. L. Robar.

The following new committees were formed during December:

Committee to Work With Inspection Department on Proper Engineering of Plans: H. H. Walker, chairman; Roy Foulkes, R. L. Booth.
Committee for Study of "Voltage Drop": R. J. Hanchett, chairman; T. H. Few, C. J. Bennett, Cecil Davey.
Committee to Change State Code Wire Size Allowances on Power Installations: J. R. Wilson, chairman; L. H. Ellett, R. J. Hanchett.

With Jim Paige as president of the Orange Belt Electric League, a number of interesting monthly meetings have been held in the various towns in and around San Bernardino, Calif., in the past few months. Jim Paige is proprietor of the **Paige Electric Company**, an active merchandising and contracting establishment in San Bernardino.

The Denver Electrical Company recently secured contract for the seven-story bus depot on Glenarm St., Denver, where considerable electric work is to be done.

Riverside Dealer Moves to Better Store Next Door

Not long before Christmas the Stewart Electric Company of Riverside, Calif., moved to larger and more attractive quarters at 639 Main St. The former location was next door, at 631 Main St. The picture at the right is one showing the Stewart Company's Christmas window displays. The company does a good merchandising business on the city's main thoroughfare.

Executive Board of Southern Division Appointed

The executive board or policy forming organization of the southern division, California Electragists, has been appointed with the following personnel:

Frank McGinley, president, southern division, Wilmington; H. H. Walker, Los Angeles; H. M. Anderson, Glendale; M. G. Barnes, Pasadena; J. J. Farley, Fullerton; R. M. Fry, Los Angeles; T. L. Hall, Pomona; J. H. Paige, San Bernardino; J. M. Mitchell, Oxnard; A. C. Nygaard, Compton; A. H. Ogilvie, Santa Monica; S. L. Smith, Santa Barbara; F. M. Vanderlip, Van Nuys, and L. O. Wetzel, Long Beach.

This organization, which is separate and distinct from the executive committee, meets once a month for the exchange of information on local organization activity.

The Electrical Construction Company of Fresno has been busy with the installation of an unusual electrical equipment job engineered by Carl V. Wolf, Valley Electrical Supply Company, at the new civic auditorium at Wasco, Calif. The building is being built with sufficient equipment and capacity to take care of road shows and other large productions which may come to the city. The auditorium is equipped completely with balcony floodlights, orchestra floodlights, a complete cove lighting system for the auditorium, footlights and borders containing 98 200-watt lamps, full dimmer control from the stage, etc. A feature of the job is that all service is run underground 740 ft. in 3-in. pipe to a transformer vault in the building. The primary is brought in at 11,000 volts. There are 300 ft. of secondary leaders in the building. The music room is equipped with electric heat and the operating booth equipped for two projection machines and remote control of the house lighting. Electric heating is provided for in the music room and other offices in the building. Full details of installation will appear in a later issue of Electrical West.

Committee Appointments of Northern Estimators

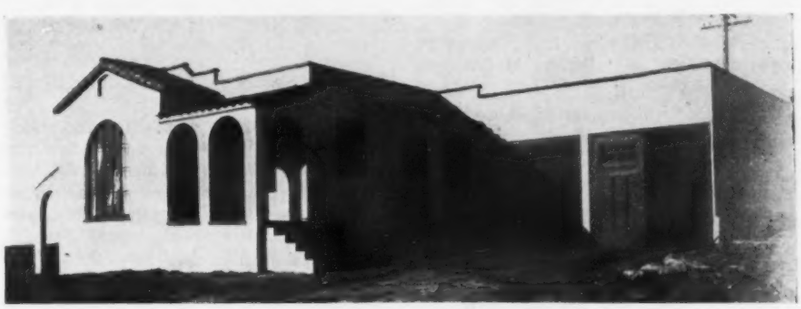
Committee appointments were made for the Estimators Section, Northern Division, San Francisco, by President V. A. Kuehn, at a recent meeting. The following appointments were made:

Executive Committee: V. A. Kuehn, president; N. M. Hope, E. L. Chaix, E. J. Douglas and W. W. Krauter.
Membership Committee: N. M. Hope, chairman; D. M. Wessel.
Constitution and By-Laws: E. Minzenmeyer, chairman; F. J. Greisberg.
Program: H. C. Snead, chairman; J. G. Carriere, W. A. Cyr.
Data: M. G. DeLong, chairman; H. Gerber, E. E. Brown.
Engineering: T. J. Bennett, chairman; E. E. Brown, H. Gerber.

Flynn-Peterson Electric Company of Santa Barbara, Calif., has moved around the corner from 7 West Carrillo St., to 935 State St., Santa Barbara, the main traffic artery of that city. The store is now in a much better merchandising location with a larger shop, space in the rear and in the basement for storage. This store handles only a few high-class lines, such as refrigerators, appliances, Telechron clocks, and fixtures. An excellent business in special refrigeration installations has been done the past year.

Roy Kenney of NePage-McKenny Company, Portland, Seattle and San Francisco, whose headquarters are in Portland, was a visitor in San Francisco recently.

Arroyo Grande Contractor Whose Home Is All Electric



A. H. Turney, electrical contractor-dealer at Arroyo Grande, recently moved into his new Red Seal home on a hill commanding a wonderful view over town, country and ocean. Mrs. Turney is particularly proud of the installation at the home which consists of electric range, kitchen fan, water heater, electric air heaters, a water-softening system, electric refrigerator and radio.

Personals

T. J. Straub New Attorney for Pacific G. and E. Co.

THE new general attorney for the Pacific Gas and Electric Company is Thomas J. Straub, who for the past seventeen years has been connected

THOMAS J. STRAUB

with that company's legal department. He succeeds the late Leo. H. Susman.

Mr. Straub, who is a graduate of the Law School of the University of Michigan, was born in Kansas in 1878. After graduation from the university in 1910 he went to San Francisco. In 1911 he entered the employ of the Pacific Gas and Electric Company in the legal department, and nine years later was placed in charge of court work. He is a member of the American, California and San Francisco Bar Associations.

G. H. Curtiss Secretary of Pacific Radio Trade Assn.

LONG active in Pacific Coast radio circles, George H. Curtiss has assumed new duties as executive secretary of the Pacific Radio Trade Asso-

GEORGE H. CURTISS

ciation, to succeed **W. J. Aschenbrenner**, who resigned to join the Frederick H. Thompson Company.

For almost 25 years Mr. Curtiss has been active in California electrical and radio circles, first with the Pacific States Electric Company, then with the predecessor of the Fobes Supply Company, and later with the Universal Electric Company. In 1926 he became sales manager of the Remler Division of the Gray & Danielson Manufacturing Company.

Last September Mr. Curtiss was elected to the radio show committee and now in his new capacity will continue as a member of that committee and as manager for the forthcoming radio show.

William Mulholland, who resigned his position as chief engineer and general manager of the Los Angeles Bureau of Water Works and Supply on Dec. 1 last after more than 50 years of service with that city, will be retained as a consulting engineer under a resolution passed by the City Council on Feb. 18. His retainer in this capacity at $6,000 per year was approved, it is reported, because the Council desires to have his advice and assistance in the planning and building of the Colorado River aqueduct. Mr. Mulholland will maintain an office at the headquarters of the Bureau.

Earle F. Whitney, for 21 years with the General Electric Company, of which nineteen have been spent on the Pacific Coast, has been promoted from the position of manager of the Portland office to be assistant manager of the east-central district of the company with headquarters at Cleveland. He entered the employ of the company on graduating from the Massachusetts Institute of Technology in 1907, spending the first two years in the East. He was transferred to San Francisco in 1909, to Seattle in 1910 and to Portland in 1912, where for some years he specialized in applications in the lumber industry. In 1923 he was made manager of the Portland territory. His promotion became effective March 1.

George Newell, for the past ten years manager of the northeastern district of the Puget Sound Power & Light Company, at Bellingham, Wash., has been transferred to Seattle to become manager of the Pacific Northwest Transportation Company, Seattle-Portland Stage Company and the North Coast Transportation Company. Mr. Newell has been associated with the power company for the past nineteen years, nine years of this time being spent as superintendent of railways in Everett, Wash.

J. M. Curtin, industrial sales manager, Westinghouse Electric & Manufacturing Company, New York, has been making an extended inspection trip of the company's various offices on the Pacific Coast. During his visit he spent several days in Los Angeles, San Francisco, Portland, Seattle and Salt Lake City.

Herbert C. Poole, Poole Electric Company, Seattle, made a recent tour of Eastern business centers.

G. A. Kumler Made Pepco Merchandise Manager

FOR the past year and a half assistant manager of the merchandise sales department, Portland Electric Power Company, Portland, George A. Kumler has been appointed merchandise manager for the company. He succeeds J. L. White, who has resigned to join the sales organization of the Walker & Pratt Manufacturing Company, which handles the sale of Crawford ranges in the Seattle territory.

Mr. Kumler, a native of Columbus, Ohio, began his career in the electrical industry by entering the employ of Erner & Hopkins, electrical jobbers of that city. He spent four years in that connection and then came to the Pacific Coast where he became affiliated with the General Electric Company. For twelve years, from 1907 to 1919, he continued in that company's employ in San Francisco and Portland, part of the period as Northwest manager of the Edison Lamp Works in Portland. Then he left to open the Electric Maid Shop at 282 Alder St. in the northern city, a retail appliance business which he operated for seven years and then sold out in 1926 following a protracted illness. After a year with the Fobes Supply Company in Portland and Seattle, he

GEORGE A. KUMLER

joined the merchandising department of the Portland Electric Power Company in July, 1927, where he has acted as assistant manager until his present promotion. The jurisdiction of his department extends over all districts and divisions of the company.

Mr. Kumler is chairman of this year's domestic electric range committee of the Northwest Electric Light and Power Association.

James B. Black, formerly vice-president and general manager, Great Western Power Company of California, San Francisco, and now vice-president of the North American Company with headquarters in New York, spent several days in March in San Francisco conferring with officials of the Great Western Power Company and the San Joaquin Light & Power Corporation, subsidiaries of the North American Company.

Don C. Ray Made President of S. F. League

THE San Francisco Electrical Development League has named as its president for the coming year Don C. Ray, manager of the Bureau of Public Relations, Pacific Gas and Electric Company.

Mr. Ray was born in Albany, Ore., and received his education in that state, graduating from the Oregon Agricultural College with the degree of B.M.E. Following a brief period of service as a clerk in the hotel conducted by his father in the northern state, he came to California in 1901 and entered the employ of the Pacific Gas and Electric Company as an office boy in the Grass Valley district office. There he rose to be collector, accountant, and finally district manager. In 1911 he was ap-

D. C. RAY

poinnted manager of the Contra Costa district with headquarters in Martinez. In 1921 he was transferred to the general office of the company in San Francisco as assistant commercial manager, and later became manager of the Bureau of Public Relations, the position he now holds.

Among other offices held by Mr. Ray is that of president of the Western Irrigation Equipment Association. He is an active worker in the Pacific Coast Electrical Association and the Pacific Coast Gas Association. In 1926 he was awarded a cup as winner of a three-minute speaking contest held during the annual convention of the gas association.

Barry Dibble, consulting engineer of Redlands, Calif., has completed a contract with the Comision Nacional de Irrigacion of Mexico, covering studies made during the past year of power possibilities on several irrigation projects.

Mrs. Ruth E. Creveling, chairman of the women's committee, Pacific Coast Electrical Association, will address the Arizona Utilities Association at its annual convention in Tucson, April 5.

A. E. Moyle has resigned from the general accounting department of the Utah Power & Light Company to join the auditing department of the Electric Bond & Share Company, New York. His work will necessitate his being on the road the greater part of the time.

L. A. Etienne and **R. L. Duval,** formerly of the St. Louis office of the Westinghouse Electric & Manufacturing Company, have been transferred to the Denver territory. Mr. Etienne succeeds **Murray Graff** who has joined the General Electric Company, and Mr. Duval takes the place vacated by **J. P. Sprunt** who has joined the Westinghouse company's Salt Lake City office. **G. R. Fickel** succeeds **A. F. McCallum** as manager of the company's service department in Denver, Mr. McCallum having been transferred to the Houston, Texas, branch of the company.

William H. Talbott, superintendent of the electric meter department, San Diego Consolidated Gas & Electric Company, left early in March on an extended business trip to the East, visiting utilities at New Orleans, Memphis, St. Louis, Springfield and Chicago. While in Memphis he attended the annual conclave of the Engineering Section, National Electric Light Association.

W. R. Marshall, Pacific Coast district manager of the Westinghouse Electric & Manufacturing Company, attended a general meeting of Westinghouse district managers held at Biloxi, Miss., in March.

J. H. Graff, Pacific States Electric Company, Seattle, recently discussed "What a Woman Should Know About Home Lighting" in the woman's department of a local newspaper.

Robert L. St. John, consulting electrical and illuminating engineer, San Francisco, recently returned from a trip to Eastern cities where he made an investigation of the newest developments in stage lighting control methods.

Julius Tuteur, president, Electric Vacuum Cleaner Company, Inc., Cleveland, spent some time in San Francisco and Los Angeles on a recent business trip to the Pacific Coast.

Stanley V. Walton, formerly with the Great Western Power Company, Oakland, is now affiliated with the Builders' Palace Exhibit in that city.

F. A. Block, Pacific States Electric Company, Seattle, recently returned to that city after a three weeks' combined business and pleasure trip to California.

Obituary

W. G. Kerckhoff, Utility Leader, Passes

WILLIAM G. KERCKHOFF, pioneer in hydro-electric power development in California, died at the age of 73 at his home in Los Angeles of a heart attack on Feb. 24.

Born at Terre Haute, Ind., in 1856, Mr. Kerckhoff came to California in 1878 and settled in Los Angeles, where his early business life was identified wtih the lumber industry. Later, in 1891, in co-operation with several associates, he organized an ice company whose plant was operated by water power.

Experience with the ice plant and its water power gave Mr. Kerckhoff the vision of building and operating hydro-electric generating plants and with associates he formed the San Gabriel

W. G. KERCKHOFF

Power Company. A power plant on the lower San Gabriel River and a transmission and distribution line to the City of Los Angeles were built in 1897, supplying the city with its first hydro-electric power. Mr. Kerckhoff also was responsible for the construction of the San Antonio Canyon plant, the Kern River plant, and the original Big Creek power project.

In 1902 Mr. Kerckhoff and his associates acquired the properties of the San Joaquin Light & Power Corporation and developed 182,350 hp. for supplying the San Joaquin Valley. He served as president of the corporation until its absorption by the Western Power Corporation in 1925. With A. G. Wishon and A. C. Balch of the San Joaquin company he organized the Midway Gas Company in 1911 for transporting natural gas from the San Joaquin Valley across the mountains to the Los Angeles metropolitan district.

Presidential positions occupied by Mr. Kerckhoff during his career include those of the Southern California Gas Company, the San Joaquin Light & Power Corporation, the Kerckhoff-Cuzner Mill & Lumber Company, the Fresno Farms Company and the South Coast Land Company.

Theodore F. Merseles, president of the Johns-Manville Corporation, New York, died of a heart attack at the Hotel Del Monte, Del Monte, Calif., on March 6. Mr. Merseles was on a business trip in the West in the interest of his company at the time of his death. He was 66 years of age.

Joe Dawson, manager of the Naches power plant of the Pacific Power & Light Company at Yakima, Wash., was electrocuted Feb. 21 when he took down a receiver to answer a telephone call. The accident is unexplained, as Mr. Dawson was alone.

John C. Fleig, for ten years an employee of the Fobes Supply Company, Seattle, died suddenly in that city on Feb. 3.

Manufacturer & Distributor

Prices of Mazda Lamps Are Again Reduced

Mazda lamp prices were again reduced on March 1, 1929, on the 50- and 60-watt lamps of the standard line of inside frosted lamps, the General Electric and Westinghouse Electric & Manufacturing Companies have announced. Price reductions were also made on all colored lamps except flame tints.

This is the twelfth time that Mazda lamp prices have been reduced since 1920. Present reduction of approximately 10 per cent brings the prices of these lamps to practically one-half of their 1914 prices.

The March 1 price reductions are as follows:

Lamp Size	Old Price	New Price
50 watt (A)	22c	20c
60 watt (A)	22c	20c
25 watt (colored)	30c	25c
40 watt (colored)	30c	25c

Joins San Francisco Force of Westinghouse Co.

Announcement has been made by the Westinghouse Electric & Manufacturing Company that **Donald McDonald** has been appointed as assistant to E. W. Nilsson, Pacific Coast advertising manager, with headquarters in San Francisco.

Mr. McDonald started his career in the electrical industry with the Westinghouse company's service department in Seattle and later was transferred to its sales department there. Then he joined the company's advertising department in Pittsburgh, where he had charge of West Coast trade paper advertising. When he left East Pittsburgh to take up the duties of his new position on the Pacific Coast, he was the head of the advertising department's newspaper advertising section. In his new position Mr. McDonald will have charge of all display advertising and publicity in newspapers and trade publications for the Westinghouse company on the Pacific Coast.

Edison Appliance Company Sales Staff Changes

Changes in its sales organization in both the San Francisco and Northwest territories have been announced by Ray W. Turnbull, Pacific Coast district manager, Edison Electric Appliance Company. J. J. Burns, who has been in charge of sales in San Francisco and Oakland will hereafter devote his time to special work at the company's headquarters in San Francisco. C. E. Allen, formerly service station manager, has joined the sales department and will have charge of the territory south of San Francisco formerly covered by Mr. Burns. M. S. Gray succeeds Mr. Allen as service station manager. A new member of the organization, Harold F. Huggins, has joined the San Francisco staff and will have charge of sales of heavy-duty electrical equipment to hotels, restaurants and apartment houses.

In the Northwest, C. J. Anderson, formerly handling only commercial cooking equipment in that territory, with headquarters in Seattle, has been transferred to Portland where he will sell apartment house ranges in addition to commercial cooking in the Portland territory. R. P. Segurson, who formerly sold apartment house ranges in the entire Northwest, now will add commercial cooking equipment and sell both lines in the Seattle territory only, retaining his headquarters in that city.

Wood Preserving Company Names Western Representative—Jones-Lyman & Company, Inc., San Francisco and Los Angeles, have been appointed by the Houston Wood Preserving Company, St. Louis, to have charge of sales of creosoted southern pine poles in the states of California, Arizona, Colorado and New Mexico.

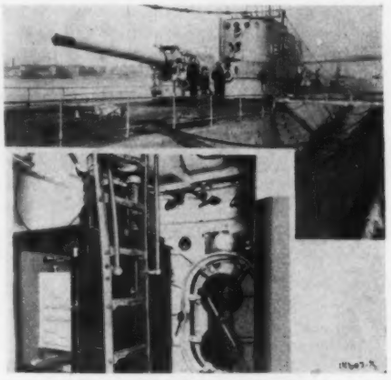
Chicago-Jefferson Fuse & Electric Company Changes Name—A change of name has been announced by the Chicago-Jefferson Fuse & Electric Company, which hereafter will be known as the **Jefferson Electric Company.** General and executive offices of the company are at 1500 South Laflin St., Chicago.

Westinghouse Absorbs Nuttall Company—The assets of the R. D. Nuttall Company have been taken over by the **Westinghouse Electric & Manufacturing Company,** which will carry on the operations of the former company as a Westinghouse branch. The plant will be known as the Nuttall Works, and the products will be called Westinghouse-Nuttall.

Local Company Furnishes Panel Boards for Vancouver Building—Electrical panels for the new Medical and Dental Building at Vancouver, B. C., are being supplied by the **Langley Manufacturing Company, Ltd.,** Granville Island, manufacturers of electrical panel boards and electric switches.

Electric Refrigeration Under the Sea

Refrigeration on submarines has long been a difficult problem. Due to the cramped quarters and the tremendous amount of machinery which must be crowded into it, the atmosphere in the quarters is exceedingly close and hot while the vessel is running on the surface with the big Diesel engines going. When submerged the Diesels are shut



off and the ship runs under electric motor power, and if submerged for any length of time the interior of the ship "sweats" and the atmosphere becomes damp.

Electric refrigerators are now being installed on a number of submarines in the United States service. The illustration shows a Copeland refrigerator installed in the corner of the galley of the U. S. submarine V-4 at the foot of the ladder leading to the conning tower.

Offers Film Showing Operation of High-Frequency Induction Furnaces—The **Ajax Electrothermic Corporation** has in preparation a film showing the operation of high frequency induction furnaces. This film will shortly be available for distribution to engineers' clubs, educational institutions and others interested.

Slogan Contest Award Winners—James Ralston, of Albany, Ore., and Eva Gillam, of Salt Lake City, were winners, respectively, of the ninth and eighteenth prizes in the Hemco Plural Plug slogan contest conducted recently by **The Bhyant Electric Company,** Bridgeport, Conn.

To Represent G & W Electric Specialty Company—C. E. Ingalls has been appointed to act as its representative in the San Francisco territory by the **G & W Electric Specialty Company,** Chicago, manufacturers of potheads, underground cable boxes, oil switches and distribution specialties. Mr. Ingalls' office is in the Rialto Building, San Francisco.

N.E.M.A. Forms High-Voltage Insulator Section—A High-Voltage Insulator Section has been formed in the **National Electrical Manufacturers Association.** The charter membership of the new section under the chairmanship of J. S. Lapp, of the Lapp Insulator Company, Inc., includes, in addition to that company, the Ohio Brass Company, Mansfield, Ohio; R. Thomas & Sons, East Liverpool, Ohio; Locke Insulator Corporation, Baltimore, Md.; Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Takes Over Seattle Storage Battery Company—The Union Battery Company, of Chicago, has purchased the storage battery manufacturing business of the **R. J. Gorman Company, Inc.,** 1801 Rainier Ave., Seattle. The purchasing company, which operates 39 battery factories; plans to increase the production of the local plant, which now produces 350 batteries a day. C. T. Gorman will continue with the company, acting as manager of the plant.

Distributors to Have New Building in Vancouver—According to H. Nemetz, managing director of **Electrical Distributors, Ltd.,** Vancouver, that company will begin shortly the construction of a new building at Cambie and Robson Sts. to house increasing stock. Mr. Nemetz recently returned from a business trip to Eastern cities of Canada and the United States.

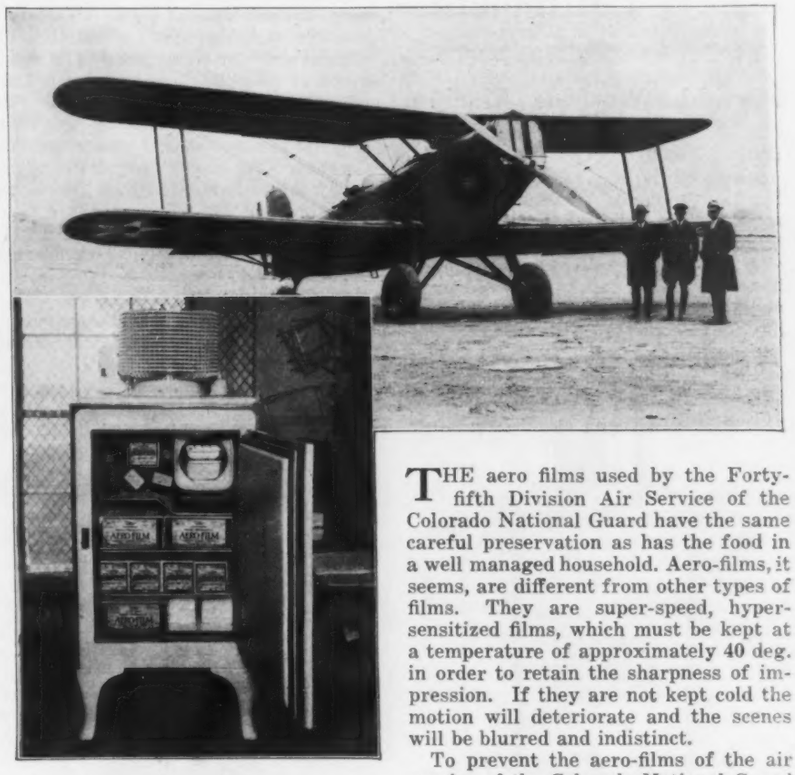
The Premier Service Company Changes Name—The Premier Service Company of Cleveland, the distributing and service subsidiary of the Electric Vacuum Cleaner Company, Inc., manufacturer of Premier electric vacuum cleaners, on March 1 became **The Premier Vacuum Cleaner Company.** Under its new name this company will continue to maintain branch offices in all large cities of the United States.

To Represent Electric Motor and Machinery Manufacturers in Seattle—Fred W. Carlson, Seattle, has resigned his position with the **Wagner Electric Corporation** to become district representative for the Howell Electric Motor Company, of Howell, Mich., and the Electric Machinery Manufacturing Company of Minneapolis. Mr. Carlson was formerly district representative for the Crouse-Hinds Company.

Albert F. Combs, Seattle representative of the **Automatic Electric Company,** with offices at 933 Henry Building, has been recalled to Los Angeles. His successor in the Seattle territory has not yet been named.

Jack King, formerly with the **Graybar Electric Company,** Seattle, has resigned to become radio engineer and manager of the Puget Sound Broadcasting Company with offices in Seattle and Tacoma.

Electric Refrigerator Preserves the Camera's Food



THE aero films used by the Forty-fifth Division Air Service of the Colorado National Guard have the same careful preservation as has the food in a well managed household. Aero-films, it seems, are different from other types of films. They are super-speed, hypersensitized films, which must be kept at a temperature of approximately 40 deg. in order to retain the sharpness of impression. If they are not kept cold the motion will deteriorate and the scenes will be blurred and indistinct.

To prevent the aero-films of the air service of the Colorado National Guard from becoming spoiled by an uneven temperature, Major Bruce Kistler, commanding officer, arranged to have Lowry Field equipped with an electric refrigerator for their proper preservation.

The installation was made by the B. K. Sweeney Electrical Company, of Denver, distributor of General Electric refrigerators in Colorado and some sections of Wyoming and New Mexico.

Standing by the plane in the upper picture are Roy Blount, general sales manager, B. K. Sweeney Electrical Company; Major Bruce Kistler; and W. R. Trippe, sales manager of the B. K. Sweeney retail refrigerator store.

Seattle Sales Firm in New Quarters—**The Robinson Sales Company,** operated by Ray F. Robinson, formerly in the Polson Building, Seattle, has moved to larger quarters at 617 Fourth Ave. The Robinson company is distributor in the Northwest of motor control apparatus manufactured by the Industrial Controller Company, Milwaukee, as well as other lines of electrical equipment and wiring materials.

Cooper Hewitt Representative Moves—Leo Kaufmann, manager of the Bay Cities territory for the Keese Engineering Company, representative of the Cooper Hewitt organization of the General Electric Company, has announced the removal of his company's office in San Francisco to 557 Market St.

To Appoint Motor Agents—Harry Fisher, sales manager, **Reliance Electric & Engineering Company,** Cleveland, recently spent some time in the cities of Seattle, San Francisco and Los Angeles, studying conditions preparatory to appointing agents for the company's d.c. motors.

Eagle Electric Manufacturing Company Expands Its Plant—Additional space of 5,000 sq.ft. has been added by the **Eagle Electric Manufacturing Company** to its plant at 59 Hall St., Brooklyn, N. Y. This company, which manufactures electrical specialties, maintains an office and warehouse at 1066 Howard St., San Francisco.

Electro-Kold Dealer Appointed in Yakima, Wash.—Refrigerators manufactured by the **Electro-Kold Corporation,** Spokane, will be distributed in Yakima, Wash., and the Yakima Valley district by the Smith Furniture Company of that city.

Lighting Fixture Company in New Building—The Seattle Lighting Fixture Company, Seattle, headed by Walter Funfsinn, has moved to a four-story building at 222 Second Ave., which has been completely remodeled for the company.

Warren Telechron Company in New Offices—The offices of the Warren Telechron Company, Los Angeles, have been moved to Suite 419, Union Insurance Building, 1008 West Sixth St.

New Equipment

Portable Washing Machine

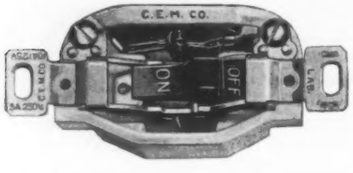
A small, portable washing machine, under the name of "Cinderella," is being marketed by the **Cinderella Washing Machine Company,** Cleveland. The operation of this small-sized washer is as follows: Clothes equivalent to the amount of six men's shirts are placed in the percelain tub section and water and soap added. Then the working unit—consisting of an open bot-

tom cylinder, surmounted by a motor and fan—is placed inside the tub and current turned on. The fan sucks out the air in the cylinder or inner chamber above the clothes, forming a partial vacuum, which causes the water level in the outer chamber to fall until air rushes in and up through the clothes to relieve the vacuum. Then the process is repeated—about fifty times every minute.

The Cinderella's top is nickel plated and the porcelain tubs are made in bright green, blue, red or ivory. Weight of the machine is 17½ lb. and size is about that of a bushel basket.—Electrical West, April 1, 1929.

Improved Toggle Switch

A new toggle switch is being placed on the market by **The Connecticut Electric Manufacturing Company,** Bridgeport, Conn. According to the manufacturer, this new switch is extremely



simple in construction, eliminating several of the parts used in the old style switch, and is a stronger and more durable switch for general use.

The simplicity of the switch lies in the construction of the yoke and the attachment of the blades to the laminated Bakelite carrier plate. All washers and the ordinary fiber insulation are eliminated. In their place is a single piece of phenolic insulation with arms extending on both sides of the yoke and held in place by a spring which also creates the necessary tension on the toggle. The blades are fastened directly to the laminated Bakelite carrier plate without use of washers or other parts. The construction is such that the spring is in upright position and is the direct agent for moving the blades when the toggle is pushed. This, the company states, provides unusually smooth operation.—Electrical West, April 1, 1929.

Cast Process Porcelain Fuse Block

A recent development of **Pass & Seymour, Inc.,** Syracuse, N. Y., is a cast process porcelain fuse block, known as P & S 4050, with a rating of 30 amp., 2,500 volts.

It is claimed that the porcelain used to manufacture this product is better

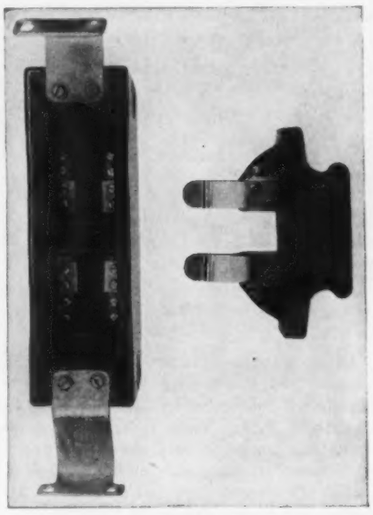
than that which is generally termed "wet process" and that the cast process gives a much denser porcelain than that obtainable by any other method. This fuse block has been developed in order to eliminate the difficulties which many central stations have experienced due to radio interference and leakages. All the metal bars are secured to the case by expansion anchors having a holding power which is greatly in excess of any load which can be put on them—Electrical West, April 1, 1929.

New Radial Switches Have Renewable Segments—A complete new line of radial rheostat switches, for varying the fields of large electric machines such as generators, motors, etc., is announced by the **General Electric Company,** Schenectady, N. Y. The switches are for general application where the current is more than 50 amp. and not over 300 amp. There are five forms, for hand, sprocket, gear, solenoid and motor operation. These bear the designations CR-8090, CR-8190, CR-8290, CR-8390 and CR-8490, respectively. The outstanding advantage of the new switches is the fact that they have renewable segments. By removing two screws any segment may be taken off without disturbing the resistor leads. The segments may be reversed for increased service.—Electrical West, April 1, 1929.

Cutout for Street Lighting Systems

To afford an easy and safe means of totally disconnecting the lamp circuit and the high-tension underground system, the **Westinghouse Electric & Manufacturing Company** has announced the manufacture of the Peerless Cutout for use on street lighting systems.

This cutout consists fundamentally of two parts—a plug assembly with film,



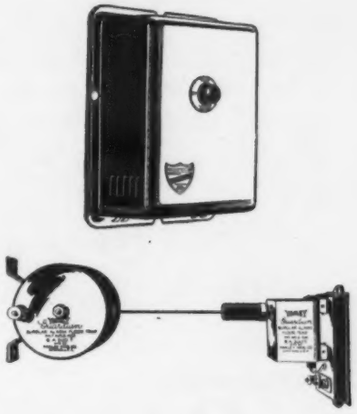
and a receptacle assembly. When the plug is removed from the receptacle both the line and lamp circuit are independently short-circuited and are insulated from one another. When the plug is inserted in the receptacle, the two line contacts are connected with the two lamp contacts and the circuit is completed.—Electrical West, April 1, 1929.

Electrically Operated Check Signer—A new model, electrically run, mechanical check signer that signs checks at the rate of 125 a minute has been announced by **The Todd Company,** Rochester, N. Y. Protection against forgery is afforded by the fact that the machine will imprint, in connection with the signature, a distinctive insignia, a photograph of the signer, or a picture of the plant across the face of which the signature appears. Two locks, controlled by different keys, safeguard the machine against the possibility of unauthorized use. A check meter registers a tally of each check signed.—Electrical West, April 1, 1929.

New Kind of Conduit—A new kind of conduit known under the 1928 National Electrical Code as "electrical metallic tubing" has been announced by the Electrical Division of **Steel and Tubes, Inc., Cleveland.** This tubing is a thin-wall, rigid conduit having all of the characteristics of the so-called heavy, standard conduit but with a lighter wall approximately one-third the thickness of standard conduit, the manufacturer states.—Electrical West, April 1, 1929.

Home Burglar Alarm

A new home alarm for protection against burglary, known as the Yaxley Guardian, has been placed on the market by the **Yaxley Manufacturing Company,** Chicago. The device is completely self-contained; it works on the closed circuit system and includes the alarm cabinet, with sensitive relay,



bell, batteries and testing key, and the Guardian trap, consisting of a swiveling receptacle and jack, insulated flexible conductor, attachment plug and an automatic reel which serves the double purpose of keeping the conductor at a proper tension and retrieving and housing the conductor when the trap is disconnected.

The trap may be set so as to extend across a door opening, or the conductor may be looped over the door knob, threaded through a window lift, attached to a window shade, curtain or portiere. In addition to affording protection to the home, the alarm may be installed in garage, chicken coop or other exterior building. — Electrical West, April 1, 1929.

Recent Publications

Autovalve Lightning Arrester—The **Westinghouse Electric & Manufacturing Company,** Pittsburgh, has recently issued leaflet No. 20149-E, a four-page publication descriptive of the type SV autovalve lightning arrester. This arrester is designed for station use on alternating current light and power circuits from 1,000 to 220,000 volts. The publication gives installation diagrams as well as descriptive information concerning the arresters themselves.

A.C. Automatic Starter—A new publication of the **Monitor Controller Company,** Baltimore, is Bulletin No. 113, which describes an alternating current automatic starter with thermal relay compensated for room temperature.

Electric Water Heaters—Catalog E, descriptive of the Clark electric water heater, has just been issued by the **McGraw Electric Company,** Omaha, Neb. Numerous photographic illustrations are used to amplify the text and show installations of Clark water heaters in bathrooms, laundries, barber shops, gasoline filling stations, office buildings and various industrial plants. Elimination of scale in heating hard water is a feature claimed for the Clark heater by the manufacturers and the present catalog describes how this is accomplished.

Porcelain Lighting Fixtures—A general catalog covering the full range of products of **Pass & Seymour, Inc.,** Syracuse, N. Y., has been issued by that company. To accompany the catalog a special Alabax porcelain lighting fixture manual in color and a folder suitable for dealer distribution, with space for imprinting, have been prepared. Copies of the catalog and circulars may be obtained by jobbers and dealers upon request of the company.

Star-Rite Appliances for 1929—An illustrated catalog under this title describes the table cooking and household appliances of the **Fitzgerald Manufacturing Company,** Torrington, Conn. This catalog as well as other literature concerning the Star-Rite appliances may be had upon request, the company states.

Oil Circuit Breakers—Circulars No. 1804 and 1812 have recently been issued by the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, describing, respectively, types 0-31 and 0-441 and types G-22 and G-222 oil circuit breakers, suitable for either indoor or outdoor use. The former are made in capacities from 600 to 2,000 amp. at 37,000 volts, and the latter in capacities from 600 to 1,200 amp. at 73,000 volts.

Radio Cabinets—"Light—The New Vogue in Radio Cabinet Design," is the title of a new portfolio published by the **Edison Lamp Works** of the General Electric Company, Harrison, N. J. In the cabinets and consoles illustrated a slowly blending and changing color accompaniment to musical numbers is achieved by means of a motor operated color cylinder, the colors showing through a curtain in the face of the cabinets. The portfolio contains a complete description of the mechanics and application of the idea.

Engineering Achievements—This booklet, published by the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, is dedicated "to the Westinghouse engineers, out of whose many achievements for the year a few are here presented as examples of the trends of the electrical industry. . . . " The pamphlet contains numerous excellent halftone illustrations.

Continuous Electric Furnace for Heat Treating Strip Metal and Wire—Bulletin No. 140, published by **H. O. Swoboda, Inc.,** consulting electrical and mechanical engineers, 3400 Forbes St., Pittsburgh, is a reprint of an article devoted to the electric tubular furnace for the continuous heat treating of strip metal and wire recently placed on the market by that company.

Power and Distribution Transformers—Bulletin No. 161, containing instructions for the installation and operation of power and distribution transformers has been issued by the **Wagner Electric Corporation,** St. Louis. The bulletin covers such subjects as location of transformers, their storage, handling and installation; drying core and coils; drying and testing oil; and proper operating temperature.

"Skip Hoists"—This is the title of an illustrated booklet issued by the **Stephens - Adamson Manufacturing Company,** Aurora, Ill. The booklet describes the design and operation of S-A skip hoists and contains charts by means of which the units for a full automatic skip hoist installation design may be selected.

"More Power to the Home"—The seventh booklet of this series under the title, "Cooking With Small Electrical Appliances," has been published by the **Women's Committee,** National Electric Light Association, 420 Lexington Ave., New York. The booklets previously published were "Wiring the House," "Better Lighting," "Washing," "Ironing," "Many Motors Make Light Work," and "Electric Range Cookery." Two more booklets will be prepared, one on "Electrical Refrigeration" and the other on "Miscellaneous Electrical Household Devices."

"Modern Metal Handling Methods"—This is the self-explanatory title of a booklet issued recently by **Cutler-Hammer, Inc.,** 158 Twelfth St., Milwaukee, Wis., describing that company's "Red Top" lifting magnets. Photographs are used almost entirely to show the application of magnets to the various kinds of work in foundries, junk yards, steel plants and miscellaneous industries. Copies may be obtained upon request of the company.

Panel Boards—On this subject the **Square D Company,** Detroit, has issued catalog No. 33-P, 1928-1929. The foreword states that in arranging this catalog it has been the aim of the company to simplify the buying of panel boards by making the catalog easier to understand and enable the purchaser to pick out exactly what he needs to fit the job, thereby saving errors and delay so costly to both the buyer and seller.

ELECTRICAL WEST Barometer of Industrial Activity in Western States

THE month of February witnessed a near record rate of operations in the manufacturing plants of the Western states. September last year is the only month reporting a higher rate of operations. Monthly reports received from about 400 large manufacturing plants in various industries and scattered throughout the eleven Western states indicate that the operations of these plants during February, after corrections are made for the number of working days, were 6.8 per cent over the current January and 20.7 per cent over February last year.

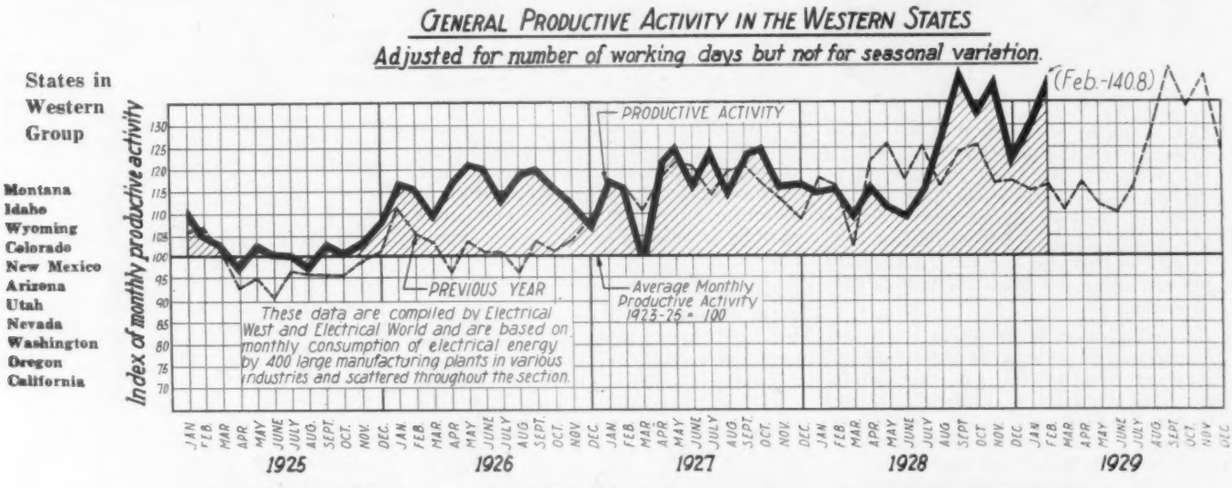
These near record operations, however, were not shared by all of the primary industrial groups of the section. Chemicals and allied products, stone, clay and glass, and the shipbuilding industrial groups reported a February rate of operations under that of February last year. On the other hand, food products, forest products, metals, paper and pulp and the rubber products industrial groups witnessed a rate of operations materially over that of February, 1928.

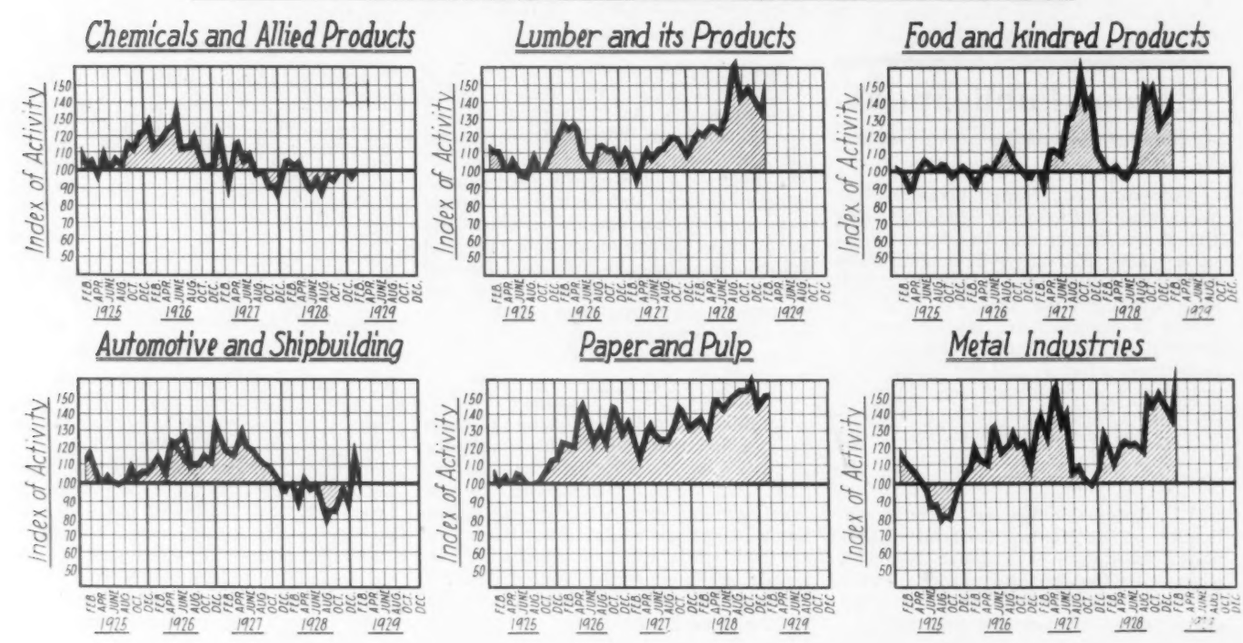
Manufacturing operations during February in the country as a whole were of record proportions. The February rate of operations, after corrections are made for the number of working days, were 6 per cent over January and 10 per cent over February last year. New high rates of productive activity were set by five of the country's primary industrial groups—rolling mills and steel plants, metal working plants, rubber products, automobile manufacturing including replacement parts and accessories, and the chemicals and allied products industrial group.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days.)

	Feb. 1929	Jan. 1929	Feb. 1928	Av. 1st 2 Mo. 1929	Av. 1st 2 Mo. 1928
All industry	140.8	131.9	116.7	136.3	115.8
Chemicals and allied products	100.2	93.7	106.9	96.9	104.8
Food and kindred products	149.3	138.4	104.8	143.8	109.7
Lumber and its products	153.0	138.3	124.2	145.6	121.7
Metals group	167.6	141.6	123.0	154.6	128.4
Paper and pulp	152.3	151.8	139.7	152.0	137.9
Rubber and its products	209.0	192.3	159.8	200.6	150.0
Shipbuilding	94.2	121.7	100.5	107.9	98.4
Stone, clay and glass	129.2	140.4	170.8	134.8	160.6
All industry, United States	140.4	132.5	127.7	136.4	123.0




PRODUCTIVE ACTIVITY IN THE PRIMARY INDUSTRIES OF THE WESTERN STATES
Chemicals and Allied Products
Lumber and its Products
Food and kindred Products
Automotive and Shipbuilding
Paper and Pulp
Metal Industries
Index of Activity